Curriculum Vitae

Name : K.S.M.S. Raghavarao

Date of birth : 02.08.1960

Present Address : Chief Scientist, Department of Food Engineering
CSIR-Central Food Technological Research Institute,
Mysore-570 020, INDIA.

Education

B.Tech (Chemical Engineering)	1981	Andhra University, Vizag.
Ph.D (Chemical Engineering)	1987	ICT,Mumbai (Formerly UDCT).
Post-Doctoral Research	1988	NIST, Boulder, USA.
Sabbatical Research (1 & ½ Yrs)	1997/98	Univ. of Colorado, USA.

Research Experience

1987 Mar - 1988 Dec	Research Associate, ICT, Mumbai.
1988 Jan - 1988 Oct	Guest Scientist, NIST, Boulder, USA.
1988 Dec - 1989 Dec	Research Associate, UICT, Mumbai.
1990 Apr - 1990 Sep	Associate Lecturer, NITW, Warangal
1990 Oct - Till date	Scientist C, E1, E2, F & G, CFTRI, Mysore.
1997 Apr - 1998 Nov	DBT Fellow, Univ. of Colorado, USA.
2002 Dec - 2012 Aug	Head, Dept. of Food Engg., CFTRI, Mysore

Career interest/ Research areas

The research work is basically the application of principles of Chemical Engineering for process and produce development in area of Food Process Engineering as well as Food and Biotechnology.

i. Novel Membrane Processes for the production of Liquid Concentrates

To overcome the drawbacks of RO, osmotic membrane distillation and direct osmosis are being developed for the concentration (above 60 °Brix) of fruit juices and natural colors.

ii. Downstream Processing of Proteins/Enzymes

An integrated approach to downstream processing for various proteins/enzymes is being developed successfully addressing the constraints on large scale.

iii. Design and Development of Equipment

a. Machinery for traditional Indian foods: Design and development of machinery for continuous production of Indian traditional foods.

b. Bioreactors: Bioreactors are being designed for solid-state fermentation and hairy root cultures, achieving high productivity.

iv. Drying and Dehydration

a. Spray drying, Fluidized bed drying: Field assisted drying of heat sensitive food and biomaterial (IR, Microwave, Acoustics and RF).

b. Osmotic Dehydration

V. Process & Product Development:

Various value added products from coconut such as virgin coconut oil, whole coconut milk powder, phycocyanins betalains, Anthocyanin, Bromelain, tender coconut water concentrate, etc.

Awards

- 2015 VASVIK Industrial Research Award in the area of Biological Sciences and Technology (VASVIK)
- 2015 Distinguished Alumnus Award (Research Category), ICT, Mumbai (UAA-ICT)
- 2015 Fellow of AP Akademy of Sciences, India (FAPAS)
- 2014 Fellow of the Indian Academy of Science, Bangalore (FASc)
- 2013 Fellow of the National Academy of Engineers, India (FNAE)
- 2013 Fellow of the National Academy of Agricultural Sciences, India (FNAAS)
- 2012 Fellow of the National Academy of Engineers, India (FNAE)
- 2012 Fellow of Association of Food Scientists and Technologiste, India (FAFSTi)
- 2010 Institution of Engineers (India) Platinum Jubilee Award in Chemical Engineering.
- 2010 Fellow of the Institution of Engineers, India (FIE).
- 2008 NASI-Reliance Industries Diamond Jubilee award
- 2010, 2007, 2005, 2004 CFTRI Foundation award for best technology transferred to industry.
- 2006 National award, Ministry of Agriculture for research on Value addition to Coconut.
- 1997 DBT, Govt of India, Longterm overseas fellowship
- 1987 Indo-US joint research fellowship

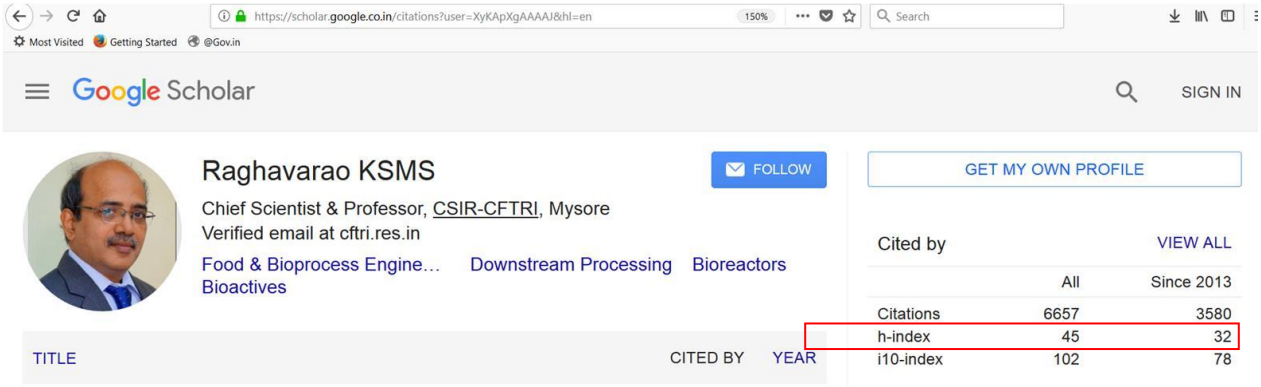
Membership in Committees

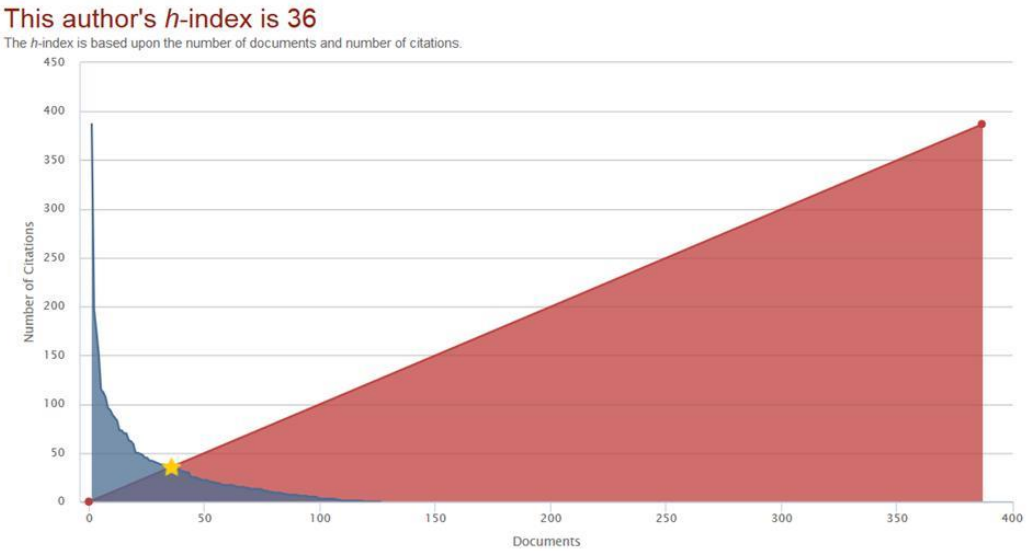
- Research Advisory Committee (RAC) Member of M/s. Richcore Biotech, Bangalore.
- Program Advisory Committee (PAC) Member of DST, DRDO, MFPI, CDB.
- Quinquennial Review Team (QRT) Member of CIFT, Cochin an ICAR Institution
- Member of editorial board for the journal of Biotechnology Advances
- Associate editor of ACES (Advances in Chemical Engineering Science), published by SCIRP (Scientific Research Publishing).
- Associate editor of the Journal Food Biology published by scholar journals
- Member of editorial board for the journal, CyTA- Journal of Food, published by Taylor & Francis.
- Member of Board of Studies in Chem. Engineering (RV Engg. College, Bangalore) & in Biotechnology, University of Mysore
- Member of Advisory committee of DBT-HRD programme at Dept. of Biotechnology, University of Mysore.

Total number of Publications

The total number of citations of over **160** publications are **6657** with h index of **45**

- **Number of research publications in standard refereed journals: 148**
- **Number of review articles in standard refereed journals: 20**
- **Number of national publications: 19**
- **Number of Journal Edited (Thematic Issues): 02**
- **Number of Books authored/edited: 20**
- **Number of Editorials: 2**
- **Number of posters in conferences/ Symposia/ Seminars etc: 146**





- https://www.scopus.com/hirsch/author.uri?stateKey=CTOF_937370996&accessor=CTO&origin=cto&display=hIndex&documentCount=126&txGid=ca9e84637a44d40057bc9ddc2eeb750a#zip

Complete list of publications in past 10 years (2008 to 2018) in standard refereed journals

S.No.	Author's Name	Title of the paper	Details	IF	Citn
1.	Hrishikesh A.Tavanandi & **KSMS Raghavarao**	Recovery of chlorophylls from spent biomass of Arthrospira platensis obtained after extraction of phycobiliproteins	Bioresource Technology, 2019, 271, 391-401	5.97	
2.	RochakMittal & **KSMS Raghavarao**	Extraction of R-Phycoerythrin from marine macro-algae, Gelidium pusillum, employing consortia of enzymes	Algal Research, 2018, 34, 1-11	4.47	
3.	Hrishikesh A Tavanandi, A Chandralekha & **KSMS Raghavarao**	A newer approach for the primary extraction of Allophycocyanin with high purity and yield from dry biomass of *Arthrospira platensis*	Separation and purification Technology 2018, 204, 162-174 doi.org/10.1016/j.seppur.2018.04.057	3.99	**1**
4.	K. Umashankar, A. Chandralekha, Tanmayee	A non-conventional method for drying of *Pseudomonas aeruginosa* and its	Drying Technology (2018, Accepted for	2.72	**1**

	D, Hrishikesh A Tavanandi & **KSMS. Raghavarao**	comparison with conventional methods	publication)		
5.	Hrishikesh A Tavanandi, Rochak Mittal, Jampani Chandrasekhar & **KSMS Raghavarao**	Simple and Efficient Method for Extraction of C-Phycocyanin from Dry Biomass of Arthospira platensis	Algal Research (2018) 31, 239-251	4.47	**5**
6.	P. Sasikala, A. Chandralekha, Ram Saran Chaurasiya, J. Chandrasekhar, K.S.M.S.	Ultrasound-assisted extraction and adsorption of polyphenols from Ginger Rhizome (Zingiber officinale)	Separation Science And Technology 53, 2018 - Issue 3, Pages 439-448	1.106	**1**
7.	Nair M Lakshmi, K Umashankar, A Chandralekha, KSMS Raghavarao, Nayana M Jayan, Chandrasekharan Salini, Ashok Pandey & Parameswaran Binod	Spray drying as effective encapsulation method for phenol degrading bacteria	Indian Journal of Experimental Biology, Vol. 55, July 2017, pp. 485-492	1.34	**1**
8.	S. Chris Felshia, N. Aswin Karthick, R. Thilagam, A. Chandralekha, K.S.M.S. Raghavarao, A. Gnanamani	Efficacy of free and encapsulated Bacillus lichenformis strain SL10 on degradation of phenol: A comparative study of degradation kinetics	Journal of Environmental Management 197 (2017) 373-383	4.01	**7**
9.	Rochak Mittal, Hrishikesh A Tavanandi, Vaibhav A.Mantri and KSMS Raghavarao	Ultrasound assisted methods for enhanced extraction of Phycobiliproteins from marine macro-algae, Gelidium pusillum (Rhodophyta)	Ultrasonics – Sonochemistry 38, 2017, 92-103	4.2	**10**
10.	Rani, Ram Saran, Aduja Naik and KSMS Raghavarao	Removal of toxic Congo red dye from water employing low-cost coconut residual fiber	Water Science and Technology 2017, 75 (9) 2225-2236	1.19	**9**
11.	Archana Lamdande, Maya Prakash, KSMS Raghavarao	Storage Study and Quality Evaluation of Fresh Coconut Grating	Journal of Food Processing and Preservation, 2018, 42 (1), 1-14	0.79	
12.	A. Chandralekha, Anupama Rani, Hrishikesh A Tavanandi, N. Amrutha, Umesh Hebbar & **KSMS Raghavarao**	Role of Carrier Material in Encapsulation of Yeast (Saccharomyces cerevisiae) by Spray Drying	Drying Technology **35, 2017, 1029-1042**	1.97	**8**
13.	A. Chandralekha, A. Hrishikesh Tavanandi, N. Amrutha, H. Umesh Hebbar, **KSMS Raghavarao** & Ramachandra Gadre	Encapsulation of Yeast (*Saccharomyces cerevisiae*) by Spray Drying for Extension of Shelf Life	Drying Technology 34, 11, 2016, 1307-1318	1.97	**12**
14.	GC Jeevitha, Umesh Hebbar, KSMS. Raghavarao	Modeling of peroxidase inactivation and temperature profile during infrared blanching of red bell pepper	Journal of Food Processing and Preservation 40, 1, 2016, 83-93	0.79	**2**
15.	Chandrasekhar J and **Raghavarao KSMS**	Differential partitioning for purification of anthocyanins from Brassica oleracea L.	Separation and Purification Technology (2015)	3.359	**5**
16.	K.Venkatesh Murthy, ML. Sudha, R. Ravi, **KSMS. Raghavarao**	Optimization of pneumatic sheet extrusion of whole wheat flour dough (for *poory*) using response surface	Journal of Food Science and Technology, (In	1.26	**2**

		methodology	press) 2014		
17.	Lakshmi MC, Amrutha N, Hrishikesh A & **Raghavarao KSMS**	Stabilization of Lipoxygenase-1 from Glycine max by microencapsulation	Drying Technology, 2014, 33 (4), 493-501	1.97	**3**
18.	Madhusudhan MC and **Raghavarao KSMS**	Integration of aqueous two-phase extraction with membrane processes for the recovery of enzymes from baker's yeast	Applied biochemistry and Microbiology (Accepted for Publication, 2015)	0.659	
19.	Madhusudhan MC and **Raghavarao KSMS**	Electro-extraction studies of proteins in polymer/salt aqueous two-phase systems	Food and Bioproducts processing, (Accepted for Publication, 2015)	1.97	
20.	S. Chethana, Chetan A. Nayak, M. C. Madhusudhan and **KSMS Raghavarao**	Single step aqueous two-phase extraction for downstream processing of C-phycocyanin from Spirulina platensis	Journal of Food Science and Technology (2014) (DOI 10.1007/s13197-014-1287-9)	1.26	**21**
21.	Chandrasekhar J and **Raghavarao KSMS.**	Separation and concentration of jamun anthocyanins: An integrated process.	Chemical Engineering Communications, 2014 (DOI:10.1080/00986445.2014.935351).	1.29	**4**
22.	J Chandrasekhar, G Sonika, MC Madhusudhan and **KSMS Raghavarao**.	Differential partitioning of betacyanins and betaxanthins employing aqueous two phase extraction.	Journal of Food Engineering, 144 (2015) 156–163 (DOI - 10.1016/j.jfoodeng.2014.07.018).	3.09	**19**
23.	M. C. Madhusudhan, A. Hrishikesh and **KSMS. Raghavarao**	Partitioning of Invertase in Nanoparticle Incorporated Aqueous Two-phase Systems	Current Biochemical Engineering, 2014, 1, 000-000		**1**
24.	J Chandrasekhar, Aduja Naik and **KSMS Raghavarao**	Purification of anthocyanins from jamun (Syzygium cumini L.) employing adsorption	Separation and Purification Technology, 125 (2014) 170–178	3.35	**44**
25.	Amrutha N, SG Prapulla, Umesh Hebbar and **KSMS Raghavarao**	Effect of Additives on Quality of Spray-Dried Fructooligosaccharide Powder	Drying Technology (2014) 32 (9), 1112-1118	1.97	**12**
26.	BS Priyanka, KS Abhijith, NK Rastogi, **K Raghavarao**, MS Thakur	Integrated Approach for the Extraction and Purification of IgY from Chicken Egg Yolk	Separation Science and Technology 49 (4), 562-568, (2014)	1.1	3
27.	Chethana S, Chetan A Nayak, Madhusudhan MC and **KSMS Raghavarao**	Single step aqueous two-phase extraction for downstream processing of C-phycocyanin from Spirulina platensis	Journal of Food Science and Technology, 2014, 1-7	1.26	**15**
28.	Aduja Naik, Maya Prakash, Ravi R and KSMS Raghavarao	Storage Study and Quality Evaluation of Coconut Protein Powder	Journal of Food Science 2013, 78(11), S1784–S1792	1.81	**4**
29.	Aduja Naik, GV Venu, Maya Prakash and KSMS Raghavarao	Dehydration of coconut skim milk and evaluation of functional properties	CyTA - Journal of Food 2014, 12 (3), 227-234	1.1824	**3**

30.	GC Jeevitha, H. Umesh Hebbar & **KSMS Raghavarao**	Electromagnetic radiation based dry blanching of Red Bell Pepper: A comparative study	Journal of Food Science, 36, 2013, 663-674	1.81	19
31.	BS. Priyanka, NK. Rastogi, **KSMS. Raghavarao**, MS. Thakur	Optimization of extraction of luciferase from fire flies (*Photinus pyralis*) using aqueous two phase extraction	Separation and Purification Technology, 118 (2013) 40–48.	3.35	**8**
32.	J. Chandrasekhar, M.C. Madhusudhan, **K.S.M.S. Raghavarao**	Extraction of anthocyanins from red cabbage and purification using adsorption	Food and Bioproducts Processing, 90, 4, 2012, 615-623	1.97	**80**
33.	Aduja Naik SN Raghavendra & **KSMS. Raghavarao**	Production of coconut protein powder from coconut wet processing waste and its characterization	Applied Biochemistry and Biotechnology 2013, 167(5), 1290-1302	1.735	22
34.	A. Hrishikesh Tavanandi, S. Deepak, K. Venkatesh Murthy, **KSMS. Raghavarao**.	Development of a continuous lemon cutting machine	Journal of Food Science and Technology 2013, 1-8	1.26	5
35.	Shipra Tiwari, K. V. Harish Prashanth, Revathi Bhaskaran, Usha Devi, Maya Prakash, NK Rastogi & K. S. M. S. **Raghavarao**	Effect of Chitosan and its Blended Films on the Shelf Life and Quality of Green peppers and Grapes during Modified Atmosphere Storage.	Trends in carbohydrate research, 2013, 5 (1), 33-44	-	
36.	Umesh Hebbar, B. Sumana, Hemavathi A.B and **KSMS Raghavarao**	Separation and purification of Bromelain by Reverse micellar extraction coupled with ultrafiltration and comparison with other methods	Food and Bioprocess Technology (2012), 5, 1010-1018	2.57	37
37.	BS. Priyanka, NK. Rastogi, **KSMS. Raghavarao**, MS. Thakur	Downstream processing of luciferase from fireflies (*Photinus pyralis*) using aqueous two-phase extraction	Process Biochemistry (2012) 47(9), 1958-1363	2.49	21
38.	M. C. Lakshmi & M. C. Madhusudhan & **KSMS Raghavarao**	Extraction and purification of lipoxygenase from soybean using aqueous two-phase system	Food Bioprocess Technology,(2012), 5(1), 193-199	2.691	22
39.	MC. Lakshmi & **KSMS. Raghavarao**	Extraction and Concentration of Isoflavones from Soybean (Glycine max)	Separation science and Technology 2013, 48(1), 166-174	1.171	3
40.	Madhusudhan. MC & **KSMS Raghavarao**	Aqueous two phase extraction of invertase from baker's yeast: Effect of process parameters on partitioning	Process Biochemistry, 2011, 46(10), 2014-2020	2.516	32
41.	Umesh Hebbar, B. Sumana, Hemavathi A.B and **KSMS Raghavarao**	Reverse micellar extraction of bromelain from pineapple (Ananas comosus L. Merryl) waste: scale-up, reverse micelles characterization and mass transfer studies	Separation Science and Technology, 2011. 46(10), 1656-1664	1.171	16
42.	Sukumar Debnath, **KSMS Raghavarao**, BR Lokesh	Hydrodynamic, thermo-analytical and molecular structural investigations of enzyme interesterified oil and its thermo-oxidative stability by thermogravimetric analysis	Journal of Food Engineering, 2011, 105(4), 671-679	3.09	10
43.	N Chhanwal, D Indrani, **KSMS Raghavarao** and C Anandharamakrishnan	Computational fluid dynamics modeling of bread baking process	Food research international (2011) 44 (4), 978-983	3.08	29

44.	Hemavathi. AB & **Raghavarao**. **KSMS**	Membrane processing for purification and concentration of β-glycosidases from barley (Hordeum vulgare)	Biotechnology and bioprocess engineering, 16(2), 282-290	1.113	5
45.	AV. Narayan, MC. Madhusudhan and **KSMS**. **Raghavarao**	Demixing kinetics of phase systems employed for liquid–liquid extraction and correlation with system properties	Food and Bioproduct processing, (2010), 89(4), 251-256	2.474	9
46.	Lakshmi. M. C. and **Raghavarao KSMS**	Downstream processing of soy hull peroxidase employing reverse micellar extraction	Biotechnology and Bioprocess Engineering (2010) 15(6), 937-945	1.113	15
47.	A Anishaparvin, N Chhanwal, D Indrani, **KSMS Raghavarao**, C Anandharamakrishnan	An Investigation of Bread- Baking Process in a Pilot- Scale Electrical Heating Oven Using Computational Fluid Dynamics	Journal of food science, (2010), 75(9), E605-E611.	1.81	14
48.	K.Venkatesh Murthy and **KSMS**.**Raghavarao**	Analysis of modes of heat transfer in baking Indian rice pan cake (Dosa,) a breakfast food	Journal of food science and technology (2010) DOI 10.1007/s 13197-010-0204-0	1.26	2
49.	SN Raghavendra and **KSMS Raghavarao**	Aqueous extraction and enzymatic destabilization of coconut milk emulsions	Journal of American Oil Chemists Society 2011, 88(4), 481-487	1.541	22
50.	M.C. Madhusudhan, S. Chethana and **KSMS Raghavarao**	Electrokinetic Demixing of Polymer/Salt Systems Containing Biomolecules	Separation Science and Technology (2011) 46, 1-7	1.171	6
51.	AB. Hemavathi and **KSMS**. **Raghavarao**	Differential partitioning of β-galactosidase and β-glucosidase using aqueous two phase extraction	Process Biochemistry, (2011), 46, 649-655	2.516	28
52.	N Chhanwal, A Anishaparvin, D Indrani, **KSMS Raghavarao**, C Anandharamakrishnan	Computational fluid dynamics (CFD) modeling of an electrical heating oven for bread-baking process	Journal of Food Engineering, 100, (2010), 452-460.	3.09	53
53.	Chetan A. Nayak, NK. Rastogi and **KSMS Raghavarao**	Bioactive constituents present in Garcinia indica Choisy and its potential food applications: A review	International Journal of Food Properties, (2010) 13, 441-453	1.4	34
54.	KH Vishwanathan, H Umesh Hebbar and **KSMS Raghavarao**	Hot air assisted infrared drying of vegetables and its quality	Food Science and Technology Research (2010), 16(5), 381-388	0.459	24
55.	S.N. Raghavendra and **KSMS Raghavarao**	Effect of different treatments for the destabilization of coconut milk emulsion	Journal of Food Engineering, 97, (2010), 341-347	3.09	71
56.	A.B. Hemavathi, H. Umesh Hebbar, **KSMS Raghavarao**	Mixed reverse micellar systems for extraction and purification of β-glucosidase	Separation and Purification Technology, 71, (2010) 263-268.	3.35	32
57.	C. Swapna Joseph , KV Harish Prashanth,NK Rastogi, AR Indiramma , S Yella Reddy & KSMS **Raghavarao**	Optimum blend of chitosan and poly-(ε-caprolactone) for fabrication of films for food packaging applications	Food Bioprocess Technol (2009) 4:1179–1185	2.691	54

58.	Ganapathi Patil, M.C. Madhusudhan, B. Ravindra Babu and **KSMS Raghavarao**	Extraction, dealcoholization and concentration of anthocyanin from red radish	Chemical Engineering and Processing (2009), 48 (1), 364-369.	2.23	82
59.	AV Narayan, MC Madhusudan and **KSMS Raghavarao**	Extraction and purification of Ipomoea peroxidase employing three-phase partitioning	Applied Biochemistry and Biotechnology (2009), Volume 161 (2-3), 263-272	1.735	58
60.	B. Ravindra Babu, NK. Rastogi and **KSMS Raghavarao**	Mass transfer in Osmotic Membrane Distillation of liquid foods	Chemical Business (Special issue), (2008), 22 (9), 51-55	-	46
61.	A.B. Hemavathi, Umesh Hebbar, and **KSMS Raghavarao**	Reverse micellar extraction of β-galactosidase from barley (Hordeum vulgare)	Applied Biochemistry & Biotechnology, (2008) 151(2-3) 522-531	1.735	14
62.	Chethana S, Ganapathi Patil, Madhusudhan MC and **KSMS Raghavarao**	Electrophoretic Extraction of Cells/Particles in a Counter Current Extractor	Separation Science and Technology, (2008), Vol. 43(14) 3583-3600.	1.171	1
63.	K Venkatesh Murthy, R Ravi, K K Bhat and **KSMS Raghavarao**	Studies on roasting of wheat using fluidized bed roaster	Journal of Food Engineering 89 (3), 336-342	3.09	29
64.	B. Ravindra Babu, NK. Rastogi and **KSMS Raghavarao**	Concentration and temperature polarization effects during osmotic membrane distillation	Journal of Membrane Science (2008) 322, 146-153	6.056	60
65.	K. Venkatesh Murthy, H. Umesh Hebbar, R. Chetana and **KSMS Raghavarao**	Optimization of process parameters for boondi preparation	Journal of Food Science and Technology 45 (2), pp. 123-126	1.26	2
66.	Ganapathi Patil, Chethana S, Madhusudhan MC and **KSMS Raghavarao**	Fractionation and purification of phycobiliproteins from Spirulina platensis	Bioresource Technology, 99 (2008) 7393–7396	5.6	67
67.	Umesh Hebbar, B. Sumana and **KSMS Raghavarao**	Use of reverse micellar systems for the extraction and purification of bromelain from pineapple wastes	Bioresource Technology (2008), 99(110), 4896-4902.	5.6	148
68.	MC Madhusudhan, **KSMS Raghavarao** and Sanjay Nene	Integrated process for extraction and purification of alcohol dehydrogenase from Baker's yeast involving precipitation and aqueous two phase extraction	Biochemical Engineering Journal (2008), 38 (3), 414-420.	2.89	56
69.	B. Ravindra Babu, NK. Rastogi and **KSMS Raghavarao**	Liquid–liquid extraction of bromelain and polyphenol oxidase using aqueous two-phase system	Chemical Engineering and Processing, 47 (2008) 83-89	2.071	186
Review Papers (in past 10 years)					
70.	Hrishikesh AT, Dugeshwar Karley, K, Rochak Mittal, Venkatesh Murthy & **KSMS Raghavarao**	Equipments for demixing of aqueous two phase systems	Current Biochemical Engineering, 2 (2), 148-167, **(**2015)		
71.	Richa Sharma, K V Ragavan, M. S. Thakur and **KSMS Raghavarao**	Recent advances in nanoparticle based aptasensors for food contaminants	Biosensors and Bioelectronics (IF:6.45) , 74 612–627. (2015)		91

72.	Chandrasekhar J, Hrishikesh A Tavanandi and **KSMS Raghavarao**	Application of ionic liquids in separation and downstream processing of biomolecules	Current Biochemical Engineering, , 2 (2), 135-147 **(**2015)	1
73.	Aduja Naik, MC Madhusudhan, **KSMS Raghavarao** and Dilip Subba	Downstream processing for production of value added products from coconut	Current Biochemical Engineering, 2 (2), 168-180 (2015)	
74.	Ram Saran Chaurasiya, Umesh Hebbar & **KSMS Raghavarao**	Recent developments in nano particulate based reverse micellar extraction for Downstream processing of biomolecules	Current Biochemical Engineering 2 (2), 118-134 **(**2015),	1
75.	Madhusudhan MC,Amrutha.N, Anupama rani, and **KSMS Raghavarao**	Aqueous two phase extraction in Downstream processing,	Current Biochemical Engineering 2(1) 39-48 (2015)	1
76.	N. Chhanwal, A. Tank, **KSMS. Raghavarao** and **C.** Anandharamakrisnan	"Computational fluid dynamics applications in bread baking process",	*Food and Bioprocess Technology.* 2012, 5(4), 1157-1172,	21
77.	N. N. Misra , B. K. Tiwari, **KSMS. Raghavarao** and P. J. Cullen	Nonthermal plasma Inactivation of Food Borne Pathogens	Food Engineering Reviews, Vol-3(3-4), (2011), 159-170,	255
78.	Chetan A Nayak, Navin.K.Rastogi, **KSMS Raghavarao**	Bioactive constituents present in *Garcinia Indica Choisy* and its potential food applications: A review.	International Journal of Food Properties 13 (3), 441-453, 2010	34

Journals Edited (Thematic Issues) (in past 10 years)

S.No	Authors	Journal
1	**KSMS Raghavarao**	Thematic issue: Downstream processing: prospects and problems (part-1), Current Biochemical Engineering, (2015)
2	**KSMS Raghavarao**	Thematic issue: Downstream processing: prospects and problems, (part-2) Current Biochemical Engineering, (2015)

Editorials: (in past 10 years)

S.No	Authors	Name of the paper	Journal
1	**KSMS Raghavarao**	Editorial , 2 (1), 3, **(**2015)	Downstream processing: prospects and problems, CBE
2	**KSMS Raghavarao**	Editorial , 2 (2), 101, **(**2015)	Thematic issue: Downstream processing: prospects and problems, CBE

Publications in National Journals (in past 10 years)

1.	K.S.M.S. Raghavarao, Navin K. Rastogi and A. Hrishikesh	Value-added products from coconut	Indian Coconut Journal Vol LIV (7), 11-14. 2011,

Number of Books authored/edited (in past 10 years)

1.	**KSMS Raghavarao,** B. Ravindrababu, N.K. Rastogi, G. Muralikrishna and K. Mahalingeswara Bhat	Application of polysaccharides in food and non-food industries.	In- Agriculture and food chemistry, Eds- DI. Givens and NK. Bhat, Research sign post publications, India (2008), 1-38.
2.	Sanjay Nene ,Ganapathi Patil and **KSMS Raghavarao**	Membrane distillation in food processing	Hand book of membrane separation: Chemical, pharmaceutical and biotechnological applications, Marcel Dekker Publications, New York (2009), 513-552
3.	AB. Hemavathi, Umesh H. Hebbar, and **KSMS Raghavarao**	Reverse micellar extraction of bio active compounds for food products.	Enhancing extraction processes in food processing industry, (Taylor and Francis publications) Editor- Da-Wen Sun, (2011), 400-431
4.	MC. Madhusudhan & **KSMS Raghavarao**	Extraction and purification of pigments and enzymes from *Beta vulgaris* using aqueous two phase extraction	Red beet biotechnology for food and biopharmaceutical applications, (2011), 393-406 (Springer publications) Editor: Bhagyalakshmi Neelwarne,
5.	MC. Madhusudhan, MC. Lakshmi and **KSMS Raghavarao**	Aqueous two phase extraction of enzymes for food processing	Enhancing extraction processes in food processing industry, (Taylor and Francis publications) Editor- Da-Wen Sun, (2011) 438-471
6.	**KSMS. Raghavarao**, NK. Rastogi and K. Niranjan	Advances in reverse osmosis technology for processing of fruit juices	Membrane processes for sustainable growth, Nova Sciences Publishers, UK (Ed. Basile A. and Cassano A.), 2013, 289-312
7.	**Raghavarao KSMS,** Madhusudhan MC, Hrishikesh A Tavanandi and K Niranjan	Athermal Membrane Processes for the Concentration of Liquid Foods and Natural Colours	Emerging Technologies for Food Processing". Editor Da-Wen Sun (Academic press, Elsevier publications), 2013 *(In Press)*
8.	NK. Rastogi, **KSMS. Raghavarao**, and K. Niranjan	Recent developments in osmotic dehydration	Emerging Technologies for Food Processing". Editor Da-Wen Sun (Academic press, Elsevier publications), 2013 *(In Press)*
9.	J Chandrasekhar and **KSMS Raghavarao**	Purification and concentration of anthocyanins from jamun: An integrated process	***Chemical and Biochemical Engineering: Trends and Developments,*** Apple Academic Press, Taylor & Francis Group, 2019
10.	Navin K. Rastogi, Sachin R. Adsare, Dugeshwar Karley, K. Niranjan and **KSMS Raghavarao**	Osmotic dehydration: applications and recent advances	National Institute of Food Technology Entrepreneurship and Management (NIFTEM), 2014 (Accepted)
11.	Richa Sharma, K.V. Ragavan, **KSMS Raghavarao** and M.S. Thakur	Nano-aptamer based quantitative detection of chloramphenicol	Biotechnology and Biochemical Engineering, Select Proceedings of ICACE 2015, B.D. Prasanna et al. (eds.), Springer, 2016, 187-195
12.	**Hrishikesh A Tavanandi**, Chandralekha A & KSMS	Sustainable pre-treatment methods for downstream	"Sustainable downstream processing

	Raghavarao	processing of harvested microalgae" in the book edition.	of microalgae for industrial application" by the CRC Press (Taylor & Francis Group), Florida, USA **(in progress)**

NO. OF PATENTS GRANTED/APPLIED FOR: 76

Patents	**Granted**
US Patents (Granted)	6
PCT Patents (Granted)	19
Indian Patents (Granted)	24
Indian Patents (Filed)	27

International Patents

Sl. No.	**Title**	**Country**	**Patent No. & Date of Filing**	**Granted on**	**Names of inventors**
US Patents Granted					
1.	A process for the preparation of garcinia extract powder from *G. pedunculata*	US	(US Patent # 20050136143)		Anandharamakrishnan, GK Jayaprakasha, BS Jena, RS Barhate, SG Jayaprakash **KSMS Raghavarao**, and KK Sakariah,
2.	Athermal process for the concentration of Garcinia extract	US	US Patent filed on Dec 2003. (US patent # 7431951) (Publication no. US2007/0154578 A1) 24-08-2006	05-07-2006	C. Anandharamakrishnan, Naveen Nagaraj, GK Jayaprakasha, BS Jena, MC Varadaraj, **KSMS Raghavarao**
3.	A new aqueous two phase system, Provisional	US	US patent application filed (US Patent # 60/104, 483, Oct 16, 1998).		**Raghavarao KSMS** and Paul Todd,
4.	A new method for demixing of aqueous two-phase systems,	US	US patent application filed (US Patent # 6, 090, 295 18th July, 2000).		**Raghavarao KSMS** and Paul Todd,
5.	" An improved process for production of oryzanol enriched fraction from rice bran oil soap stock	US	(US Patent # 6896911) (2003)		T.N. Indira, A.V.Narayan, R.S.Barhate **KSMS Raghavarao**, S. Khatoon, C. Gopal, A.G. Appu Rao and V. Prakash
6.	"A process for the recovery of polyethylene glycol (PEG) from spent aqueous two-phase systems"	US	(US Patent # 6863828) Appl no 396125 (2003)	08-03-2005	Naveen Nagaraj, Chethana S, **KSMS Raghavarao**,

PCT Patents

7.	"A process for the recovery of polyethylene glycol (PEG) from spent aqueous two-phase systems"	Brazil	(Br Patent # PI0318257-6)	29-11-2011	Naveen Nagaraj, Chethana S, **KSMS Raghavarao**,
8.	"A process for the recovery of polyethylene glycol (PEG) from spent aqueous two-phase systems"	China	(CN Patent # ZL03826409-9) Appl no. 03826409.9	17-09-2008	Naveen Nagaraj, Chethana S, **KSMS Raghavarao**,
9.	"A process for the recovery of polyethylene glycol (PEG) from spent aqueous two-phase systems"	Denmark	(DN Patent # 10394224) Appl no. 10394224.6)	30-08-2007	Naveen Nagaraj, Chethana S, **KSMS Raghavarao**,
10.	"A process for the recovery of polyethylene glycol (PEG) from spent aqueous two-phase systems"	WO	PCT/IN03/00116		Naveen Nagaraj, Chethana S, **KSMS Raghavarao**,
11.	"A process for the recovery of polyethylene glycol (PEG) from spent aqueous two-phase systems"	Japan	JP/2004-570085 Pat no. 4611032	22-10-2010	Naveen Nagaraj, Chethana S, **KSMS Raghavarao**,
12.	A novel process for the encapsulation Garcinia extract powder (2009),	Japan	Japan Patent No. JP- 4408815 Appl no 2004-569896 26-03-2003	20-11-2009	C. Anandharamakrishnan, GK Jayaprakasha, BS Jena, RS Barhate, SG Jayaprakash and **KSMS Raghavarao**,
13.	A novel process for the encapsulation Garcinia extract powder (2009),	LK	Patent No. 13829 Appl no 13829 26-03-2003	08-03-2011	C. Anandharamakrishnan, GK Jayaprakasha, BS Jena, RS Barhate, SG Jayaprakash and **KSMS Raghavarao**,
14.	A novel process for the encapsulation Garcinia extract powder (2009),	Philipines	Patent No. 12005501732 Appl no 1-2005-501732	17-08-2012	C. Anandharamakrishnan, GK Jayaprakasha, BS Jena, RS Barhate, SG Jayaprakash and **KSMS Raghavarao**,
15.	A novel process for the encapsulation Garcinia extract	PCT	PCT patent no. WO 2004/084654		C. Anandharamakrishnan, GK Jayaprakasha, BS Jena, RS Barhate, SG Jayaprakash and **KSMS Raghavarao**,
16.	Process for crystallization of oryzanol from oryzanol enriched fraction derived from rice bran oil soap stock;	Mexico	Mexican Patent # MXPA/a/2005/006 725, 2005. 17-06-2005	02-12-2005	A.V. Narayan, R.S. Barhate, T.N. Indira, T. Purnima Kaul, G. Appu Rao, V. Prakash & **KSMS Raghavarao**,

17.	A simple process for crystallization of oryzanol from oryzanol enriched fraction	Mexico	Mexican Patent # 274579	19-03-2010	A.V. Narayan, R.S. Barhate, T.N. Indira, T. Purnima Kaul, G. Appu Rao, V. Prakash & **KSMS Raghavarao**,
18.	A simple process for crystallization of oryzanol from oryzanol enriched fraction	Australia	AU Patent # 20022348729	09-07-2010	A.V. Narayan, R.S. Barhate, T.N. Indira, T. Purnima Kaul, G. Appu Rao, V. Prakash & **KSMS Raghavarao**,
19.	Processo simples para cristaliza§¥o de orizanol a partir de fra§¥o enriquecida de orizanol,	Brazil	BR Patent # 200215991, 2005. 08-12-2002	01-11-2005	A.V. Narayan, R.S. Barhate, T. N. Indira, T. Purnima Kaul, **KSMS Raghavarao**, G. Appu Rao, V. Prakash.
20.	Integrated hot air roasting machine; machine de torrefaction a air chaud integer (2006)	PCT	WO2006103526. 29-03-2006	05-10-2006	Venkatesh Murthy, K; **Raghavarao KSMS**; Shivakumar M.; Bhat K.K; Lingamallu Jagan Mohan Rao;Mehendale L.; Goel A K,
21.	Athermal process for the concentration of Garcinia extract	Indonesia	Indonesian appl no W-00200601792. Patent No. ID0020811	23-09-2008	C. Anandharamakrishnan, Naveen Nagaraj, GK Jayaprakasha, BS Jena, MC Varadaraj, **KSMS Raghavarao**
22.	Athermal process for the concentration of Garcinia extract	Japan	Japan patent no. 4499664 22-12-2003	23-04-2010	C. Anandharamakrishnan, Naveen Nagaraj, GK Jayaprakasha, BS Jena, MC Varadaraj, **KSMS Raghavarao**
23.	Athermal process for the concentration of Garcinia extract	Australia	Australian patent, Application no. 2003288621. Pat no no. 2003288621	30-09-2010	C. Anandharamakrishnan, Naveen Nagaraj, GK Jayaprakasha, BS Jena, MC Varadaraj, **KSMS Raghavarao**
24.	Athermal process for the concentration of Garcinia extract	LK	Application no. 14133. Patent no. 14133. 22-12-2003	14-10-2014	C. Anandharamakrishnan, Naveen Nagaraj, GK Jayaprakasha, BS Jena, MC Varadaraj, **KSMS Raghavarao**
25.	Athermal process for the concentration of Garcinia extract	PCT	WO Patent # 2005070863, 2005		C. Anandharamakrishnan, Naveen Nagaraj, GK Jayaprakasha, BS Jena, MC Varadaraj, **KSMS Raghavarao**

Indian Patents

Sl. No.	Title	Country	Patent No. & Date of Filing	Granted on	Names of inventors
26.	A process for the production of oryzanol-enriched fraction from rice bran oil soap stock,	India	*Indian Patent Appl. No. 394/DEL/2003* (Patent number 229981). 26-03-2003	13-03-2009	T.N. Indira, A.V. Narayan, R.S. Barhate, **KSMS Raghavarao**, S. Khatoon, C. Gopal, G. Appu Rao, V. Prakash.
27.	An Improved process for the preparation of stabilized pure phycocyanin	Indian	*Indian Patent Appl. No.* 1346*/DEL/1999* (Patent number 196988). 31-07-2002	04-08-2006	**KSMS Raghavarao**, G. Manoj, T. Ramesh and GA Ravishankar,
28.	A process for the preparation of garcinia extract powder from *G. pedunculata*	India	*Indian Patent Appl. No.* 794*/DEL/2002* (Patent number 222209). 31-07-2002	28-07-2008	C. Anandharamakrishnan, GK Jayaprakasha, BS Jena, RS Barhate, SG Jayaprakash **KSMS Raghavarao**, and KK Sakariah,
29.	A process for preparation of oryzanol flakes from the oryzanol enriched saponifiable fraction of rice bran oil	India	(Patent # 408/DEL/03) (Patent number 228714) 26-03-2003	20-02-2009	A.V.Narayan, R.S Barhate, T.N. Indira, T Purnima Kaul, **KSMS Raghavarao**, A.G.Appu Rao and V. Prakash
30.	Athermal process for the concentration of Garcinia extract	India	(Patent # 391/DEL/04NP). Patent No. 239128 20-02-2004	09-03-2010	C. Anandharamakrishnan, Naveen Nagaraj, GK Jayaprakasha, BS Jena, MC Varadaraj, **KSMS Raghavarao**
31.	An automatic device for detoxification of aflatoxin contaminated edible oils by phytolysis	India	*Indian Patent Appl. No.* 266*/DEL/2000* (Patent number 218200) 16-03-2000	26-05-2008	T. Shanta, K. Venkateshmurthy, S.G. Jayaprakashan, **KSMS Raghavarao**, T. Ramesh and P. Ramakrishna
32.	An improved process for separation of biomolecules using demixing technique of aqueous phase generation in bioreactors.	India	*Indian Patent Appl. No. 263/DEL/2000* (Patent number 217839) 16-03-2000	29-03-2008	**KSMS Raghavarao**, N.D. Srinivas.

33.	An improved process for the preparation of pure phycocyanin concentration	India	*Indian Patent Appl. No. 390/DEL/2004* Indian Patent No. 231286. 26-03-2003	04-03-2009	Chethana S, Naveen Nagaraj, G A Ravishankar, **KSMS Raghavarao**
34.	A process for preparation of food colorant from Spirulina	India	*Indian Patent Appl. No. 548/DEL/2004* (Patent number 237338) 22-03-2004	16-12-2009	RS Barhate, S. Chethana and **KSMS Raghavarao**
35.	A process for production of carotenoid from Microalgae	India	*Indian Patent Appl. No. 490/DEL/2004* (Patent number 241826) 16-03-2004	30-07-2010	R. Sarada, **KSMS Raghavarao** and GA, Ravishankar
36.	An process for the preparation of purified phycocyanin	India	*Indian Patent Appl. No. 1119/DEL/1998* Indian Patent No. 188955 Filed on 27-04-1998	19-09-2003	**KSMS Raghavarao** GP. Manoj, SG. Jayaprakashan and G A Ravishankar.
37.	A process for preparation of food colorant from Spirulina	India	*Indian Patent Appl. No. 548/DEL/2004* (Patent number 237338) 22-03-2004	16-12-2009	RS Barhate, S. Chethana and **KSMS Raghavarao**
38.	A process for the preparation of phycocyanin, a natural blue colorant from spirulina.	India	*Indian Patent No: 251116 Appl. No.* DEL/746/2005	24-02-2012	Ganapathi Patil, Chethana S., A.V.Narayan, B.K. Sandesh, G.A. Ravishankar, K Udayasankar and **KSMS Raghavarao**,
39.	A process for the recovery of proteins from fish waste	India	*Indian Patent No: 249383 Appl. No.* DEL/563/2004	18-10-2011	C. Anandharamakrishnan, GJ. Stainley, A Tamilselvi and KSMS Raghavarao

40.	Integrated Hot Air Roasting Machine Using Flue from steam generator/hot air generator.	India	*Indian Patent No: 260361* *Indian Patent Appl.* 753/DEL/2005. Filed on 31-03-2005	Awaited	K Venkatesh Murthy, **KSMS Raghavarao**, Mahadevaiah Shivakumar, KK Bhat, L. Jagan Mohan Rao
41.	An improved process for the production of Natural colour (Phycocyanin) from spirulina.	India	*Indian Patent No: 186297* *Indian Patent Appl.* 2504/DEL/1996	22-02-2002	G.Manoj, **KSMS Raghavarao,** S.G. Jayaprakashan, T. Ajith Kumar, L.V. Venkataraman and G.A. Ravishankar.
42.	A simple process for crystallization of oryzanol from oryzanol enriched fraction	Brazil	BR application number PI0215991-0	02-12-2005	A.V. Narayan, R.S. Barhate, T.N. Indira, T. Purnima Kaul, G. Appu Rao, V. Prakash & **KSMS Raghavarao**,
43.	A simple process for crystallization of oryzanol from oryzanol enriched fraction	WO	PCT Patent application # PCT/IB02/05460	02-12-2005	A.V. Narayan, R.S. Barhate, T.N. Indira, T. Purnima Kaul, G. Appu Rao, V. Prakash & **KSMS Raghavarao**,

Indian Patents Filed					
44.	Formulation of whole coconut milk emulsion for preservation processes such as dehydration.	India	*Indian Patent Appl. No. 2455/DEL/95*.	Awaited	**Rastogi**, **N.K.,** Raghavarao, K.S.M.S., Subbarao, B.H. and Jayaprakashan, S.G.
45.	An improved process for the extraction of phycocyanin from the algae spirulina	India	Patent # 1358/DEL/1996	Awaited	**KSMS Raghavarao**, G. Manoj, T. Ramesh and GA Ravishankar,
46.	A process for detachment of coconut kernel from its shell.	India	*Indian Patent Appl. 2638/DEL/1996*.	Awaited	Rastogi, NK**., Raghavarao**, **KSMS**. and Jayaprakashan, S.G.
47.	Process for preparation of spray dried sugar cane juice.	India	*Indian Patent Appl. No. 915/DEL/2001*.	Awaited	**Raghavarao**, **KSMS**., Rastogi**,** NK**.**, Shivkumar, V. and Jayaprakashan, S.G.
48.	A process for the formation of new phase system (PEG-Xanthan) for aqueous two-phase extraction.	India	*Indian Patent Appl. No. 317/DEL/2002.*	Awaited	Chetana, S., **Raghavarao**, **KSMS**. Rastogi**,** NK**.**

49.	A process for preparation of polyphenols from finger millet.	India	*Indian Patent Appl. No. 540/DEL/2003*.	Awaited	Rastogi, NK., **Raghavarao**, **KSMS**., Subramanian, R., Maya Prakash and Jayaprakashan, S.G.
50.	A nonthermal process for the preparation of tender water concentrate.	India	*Indian Patent Appl. No. 431/DEL/2003*.	Awaited	Rastogi**,** NK**.**, **Raghavarao**, **KSMS**., Nagaraj, N., Subramanian, R., Maya Prakash and Jayaprakashan, S.G.
51.	A hybrid process for the preparation of tender water concentrate. 2003.	India	*Indian Patent Appl. No. 540/DEL/2003*.		**Rastogi, N.K.**, Raghavarao, K.S.M.S., Subramanian, R., Maya Prakash and Jayaprakashan, S.G.
52.	A process for the enhancement of betanin extraction from red beetroot by application of gamma-irradiation.	India	*Indian Pat. Appl. No. 752/DEL/2005*.	Awaited	Babu, B.R., Rastogi, NK**.** **Raghavarao**, **KSMS**.
53.	A process for the preparation of dietary fiber from coconut residue.	India	*Indian Patent Application No. 741/DEL/2005*.	Awaited	Rastogi**,** NK**.**, **Raghavarao**, **KSMS**., Girish, K., Taranathan, R.N., Kumar, S., Jayaprakashan, S.G., Mahadevamma, M.
54.	Continuous Moulding machine for foods.	India	*Indian Patent Appl.* 742/DEL/2005	Awaited	K. Venkatesh Murthy, S. G. Jayaprakashan, R. Chethana, KK Bhat, Bharath, D Premkumar, **KSMS Raghavarao**,
55.	A process for the recovery of polyethylene glycol from spent aqueous two phase systems	India	(Patent # DEL/321/2006) (**Patent No 254666**)	04-12-2012	S. Chethana and **KSMS Raghavarao,**
56.	A non-thermal process for the concentration of anthocyanin, A natural red colorant	India	(Patent # DEL/317/06).	Awaited	Ganapathi Patil, S.G.Jayaprakashan, Maya Prakash and **KSMS Raghavarao**,
57.	A purification process for obtaining ultrapure C-phycocyanin	India	(Patent # DEL/597/2006).	Awaited	Ganapathi Patil, Chethana S., A.V.Narayan, G.A. Ravishankar and **KSMS Raghavarao**
58.	A sugar cane juice concentrate and process for the preparation there off	India	Patent # 0805/DEL/2008	Awaited	K. Ramalakshmi, A. Chakravarthy, B.B. Bodse, PM Badguja, Maya Prakash, Prema Viswanath, **KSMS Raghavarao**, B. Raghavan, V. Prakash

59.	A process for the production of virgin coconut oil.	India	*Indian Patent Application No. 443/DEL/2009.*	Awaited	Raghavendra, S.N. Mutry, K.V. Rastogi**,** NK**. Raghavarao**, **KSMS**., Prakash, M., Bhat, K.K.
60.	A process for the preparation of tender coconut beverage.	India	*Indian Patent Application No. 283/DEL/2009*	Awaited	Raghavendra, S.N. Rastogi**,** NK**. Raghavarao**, **KSMS**., Prakash, M.,
61.	A process for the production of coconut spread based on mature coconut- water concentrate and coconut dietary fiber.	India	*Indian Patent application No. 0287/DEL/2009.*	Awaited	Rastogi**,** NK**.**, **Raghavarao**, **KSMS**., Prakash, M.,
62.	Improved pneumatic extruder for poory and other similar products	India	Patent # DEL/135/ 2010	Awaited	K. Venkatesh Murthy, SG Jayaprakashan, G. Bammigatti and **KSMS Raghavarao**
63.	"A process for the recovery of polyethylene glycol (PEG) from spent aqueous two-phase systems"	India	Patent # 435/DEL//03	(2003)	Naveen Nagaraj, S Chethana and **KSMS Raghavarao**
64.	"An improved process for the concentration and purification of Betalains"	India	Patent # 388/DEL/03		Chethana. S and **KSMS Raghavarao,**
65.	An improved process for the fractionation of betalains into betacyanin and betaxanthin	India	(768/DEL/2005)	Awaited	Chethana S, **KSMS Raghavarao**
66.	Automatic submerged fryer for poory like products	India	Patent # NF/007/2011	Awaited	K Venkatesh Murthy, SG Jayaprakashan, G Bammigatti, I Mahesha, **KSMS Raghavarao,** ML Sudha, G Venkateshwara Rao., and R Chetana,
67.	A process for the separation of C-phycocyanin & Allophycocyanin	India	Patent # NF/304/05	Awaited	Ganapathi Patil, Chethana S., A.V.Narayan, G.Sakthivelu, G.A. Ravishankar and **KSMS Raghavarao**
68.	Process for the dehydration of vegetables using RF waves and hot air.	India	Patent # 463/NF/2004	Awaited	H Umesh Hebbar, **KSMS Raghavarao**, A Ramesh Yadav, RS Ramteke and VS Chauhan

69.	A Process for the extraction of peroxidase from radish using RME technique,	India	Patent # NF/244/06	Awaited	Umesh Hebbar and **KSMS Raghavarao**,
70.	An improved process for the production of kokum concentrate by direct osmosis membrane process.	India	Patent #NF/199/08	Awaited	Nayak, C. A., NK Rastogi and **KSMS Raghavarao,**
71.	A process for preparation of sterilized black pepper seeds using infrared energy	Indian	Patent # 0196NF2014	Awaited	GC Jeevitha, HBG Sowbhagya, H Umesh Hebbar, KSMS Raghavarao

List of Processes Developed:

1. Process for the production of spray dried coconut milk powder.
2. Process for the production of phycocyanin from spirulina platensis.
3. Process for the production dietary fiber from spent coconut residue
4. Process for the production of mango powder.
5. Process for the extraction and purification oryzanol from rice bran oil soap stock.
6. Integrated hot air roaster for roasting of grains and other food products (Design drawing).
7. Process for the extraction and purification of betalains from beet
8. Process for the production of virgin coconut oil
9. Process for the production of Improved dosa machine (Design drawings)
10. Process for the production of Sugarcane juice in tetra packs
11. Process for the production of Sugarcane juice concentrate
12. Process for the production of Tender coconut jam
13. Production of Coconut spread base on matured coconut water concentrate and coconut dietary fibre.
14. Coconut beverage in tender coconut.
15. Moulding machine for Basan, Sooji/Rava and similar Laddus.
16. Acoustic mist reactor for hairy root/plant cell cultures
17. Grating machines for vegetables.
18. Continuous circular cutting machine for citrus fruits (Lemon etc.).
19. Forming and frying machine for Poory, an Indian traditional food.
20. Continuous wet grinding machine.
21. Coconut beverage from tender coconut.
22. Continuous wet grinding machine.
23. Mini Chikki Mill

List of Processes released/Technology transferred to industry:

1. Process for the production of virgin coconut oil (Patent Application # 443/DEL/2009).
2. Process for the production of spray dried coconut milk powder (Patent Application # 2455/DEL/95)
3. Process for the production of phycocyanin from Spirulina platensis. (Patent # 237338; Patent Application # 1358/DEL/1996, 2504/DEL/1996)
4. Process for the production dietary fiber from spent coconut residue (Patent Application # 741/DEL/2005)
5. Integrated hot air (vibro fluidized bed) roaster for roasting of grains and other food products (Design drawings). (International Patent # WO2006103526, Indian patent Application # 753/DEL/2005)
6. Process for dehydrated dosa batter suitable for machine.
7. Improved dosa machine (Design drawings)
8. Process for the production of Sugarcane juice in tetra packs (Patent # 231590)

9. Process for the production of Sugarcane juice concentrate (Patent Application # 0805/DEL/2008).
10. Process for the production of Tender coconut jam (Patent # 239079, Patent Application # 0287/DEL/2009).
11. A device for pneumatic extrusion of dough (Patent Application # DEL/135/ 2010)
12. Lemon cutting machine.
12. Moulding machine for basan, soji/rava and similar laddus. (Patent Application # 742/DEL/2005)
13. Forming and frying machine for Poory, an Indian traditional food. (Patent Application # NF/007/2011)

Guidance for Research Student Programs:

Ph.D programs completed	-	18
Ph.D programs in progress	-	08
Masters programs completed	-	25
Masters programs in progress	-	01
Postdoctoral programs completed	-	05

Ph.D / Post Doctoral Programs

1. Dr. M.P. Nandakumar (FT & B E Dept., CFTRI) (Post Doctoral Research, 1992-95)
   Investigation topic: Solid-state fermentation.

2. Dr. Tanuja Srivastava, CSIR (INDIA) Research Associate (Food Engineering Dept., CFTRI) (1994-96)
   Investigation topic: Aqueous two phase extraction.

3. Dr. D.C. Saxena, Baking Technology Dept., CFTRI, Mysore (1994-96)
   Investigation topic: Heat transfer analysis of baking in tanduri oven.

4. Dr. Manoj Pillai (PCBT Dept. CFTRI) (1994-2002).
   Investigation topic: Downstream processing of phycocyanin.

5. Dr. Harish Prashanth, CSIR-RA
   Investigation topic: Biopolymer based nanocomposites: preparation, characterization and food application.

6. Dr. N. D. Srinivas, CSIR-SRF. (Ph.D - June 2001).
   Investigation topic: Aqueous two phase extraction for the downstream processing of proteins/enzymes.

7. Dr. M.N. Ramesh, Scientist, Dept of Food Engineering, CFTRI (Ph.D - August, 2001)
   Investigation topic: Heat and Mass transfer studies in drying of cooked rice and vegetables

8. Dr. R. Subramanian, Scientist, Dept of Food Engineering, CFTRI. (Ph.D - August, 2002)
   Investigation topic: Membrane processing of vegetable oil.

9. Dr. N. K. Rastogi, Scientist, (Dept of Food Engineering, CFTRI (Ph.D - February, 2004)
   Investigation topic: Kinetics of Osmotic dehydration of foods.

10. Dr. Rajendra Kumar Barhate, CSIR-SRF (Ph.D - June, 2005).
    Investigation topic: Liquid-Liquid extraction for the downstream processing of biomolecules.

11. Dr. Naveen Nagaraj, CSIR-SRF, (Ph.D - February, 2005).
    Investigation topic: An integrated biotechnological approach for the purification and concentration of liquid foods, proteins and food colors

12. Dr. Chethana S, CSIR-JRF (Ph.D - April, 2007)
    Investigation topic: Field assisted separation and downstream processing of natural colors and biomolecules

13. Dr. K. Venkateshmurthy Scientist, Dept of Food Engineering, CFTRI. (Ph.D - April, 2007)
    Investigation topic: Heat and Mass transfer in the design of equipment for traditional foods.

14. Dr. Ganapathi Patil, CSIR-SRF (Ph.D - February, 2008)

Investigation topic: Integration of osmotic membrane processes for purification and concentration of proteins, natural colors and liquid foods

15. Dr. Umesh H Hebbar, Scientist, Dept of Food Engineering, CFTRI. (Ph.D - November, 2008)
    Investigation topic: Reverse Micellar Extraction for the down stream
    Processing of proteins and enzymes.

16. Dr. A.V. Narayan, CSIR-SRF (Ph.D - May, 2009)
    Investigation topic: Two and three phase partitioning for purification and Concentration of selected bio-molecules and food colorants

17. Dr. Ravindra Babu B, CSIR-SRF (Ph.D - May, 2009)
    Investigation topic: Aqueous two phase extraction for the purification and Concentration of biomolecules from pineapple (Ananus comosus L. Merryl)

18. Raghavendra S.N., CSIR-SRF
    Investigation topic: Biotechnological approaches for the production of diversified products from coconut.

19. Hemavathi AB, CSIR-SRF
    Investigation topic: Biotechnological approaches for the downstream processing of selected enzymes.

20. Lakshmi M.C, CSIR-SRF (Feb, 2013)
    Investigation topic: Biotechnological approaches for the downstream processing of selected biomolecules from *Glycine max*

21. Madhusudhan M.C., CSIR-SRF (Jan 2014)
    Investigation topic: Extraction and purification of selected enzymes using bioprocess integration.

22. Jampani Chandrasekhar., CSIR JRF
    Investigation topic: Adsorption for the downstream processing of Biomolecules.

23. Aduja D Naik., UGC-JRF
    Investigation topic: Extraction and purification of selected biomolecules from byproducts of coconut.

Current Ph.D and Post-Doctoral Programs

24. Hrishikesh A., CSIR-SRF
    Investigation topic: Ionic liquid based extraction for separation and purification of Phycocyanin.

25. Rochak Mittal., CSIR-NET
    Investigation topic: Downstream processing for separation and purification of natural colours.

26. Richa Sharma., CSIR-GATE
    Sensing of Chloramphenicol in food using nano materials and optical reporter molecules

27. Sheshanarayan, Technical officer, FE, CFTRI
    Investigation topic: Electromagnetic field assisted dehydration of foods.

28. Archana Lamdande: RJNF-SRF
    Investigation topic: Cold processing and value added products from *Coco nucifera*.

29. Junior Ekorong Franck: TWAS Fellow, Cameroon
    Investigation Topic: Drying of Mango Kernels for extraction of Polyphenols

30. Vijaya Santhi J: SV University Engineering College, Thitupathi
    Investigation Tipic: Extraction and concentration from Coconut Whey

31. Chandralekha Devi A: Mangalore University, Mangalore
    Investigation Tipic: Integrated approach for extraction, purification and concentration of bioactives from selected algae

Projects implemented:

- **Number of Network projects: 2**
- **Number of Grant in aid projects: 21**
- **Number of sponsored projects: 6**
- **Number of consultancy projects: 18**

List of Projects implemented

S.No.	Title of Project	Project Category	Project Value (In Lakhs)	Your Role as defined
Projects completed				
	Design and development of equipment with automation and semi-automation for the production of traditional/ ethnic foods 2007-2012	Network project	2300	PI
1.	Development of biosensors for assessing the microbiological quality of foods and monitoring of formaldehyde concentration in selected marine foods. (Co-Principle Investigator) 2010-2012	Grant-in-aid	95.68	Co-PI
2.	Computational Fluid Dynamics (CFD) simulation and experimental validation for design, development and scale-up of selected unit operations in food processing 2008-2011	Grant-in-aid	26.53	Co-PI
3.	Field assisted processing of vegetables and spices for improved quality (GAP0388) 2011-2013	Grant-in-aid		**Co-Investigator**
4.	Design and Development of New Machines for Integrated Coconut Processing 2008-2010	Grant-in-aid	29.46	PI
5.	Development of a continuous wet casting machine for the production of Chitosan based biodegradable packaging film for the preservation of fruits, vegetables and processed foods 2007-2009	Grant-in-aid	24.00	PI
6.	Development of Technology for Value Addition to the By-products in Coconut Processing 2007-2009	Grant-in-aid	31.26	PI
7.	Reverse Micellar Extraction Technique for Separation/Purification of Enzymes from Natural Sources 2006- 2008	Grant-in-aid	13.93	Co-PI
8.	Aqueous Two Phase Extraction for The Purification Of Biomolecules 2005 – 2008	Grant-in-aid	40.00	PI
9.	Development of technology for the production of virgin coconut oil by wet processing 2005 –2007	Grant-in-aid	16.84	PI
10.	MATA Fruit processing plant at Imphal 2004	Grant-in-aid	310.00	Co-PI
11.	Fruit processing plant at Yelandur, BR Hills, Chikmagaluru 2003	Grant-in-aid		PI

12.	Studies and applications of LPG in food industries 2003- 2005	Grant-in-aid	17.98	Co-PI
13.	Production of Dietary Fibber from Coconut Residue 2002 –2004	Grant-in-aid	10.00	PI
14.	Osmotic membrane distillation for the concentration of liquid foods and natural colours 2001 –2003	Grant-in-aid	12.94	PI
15.	Process development for herbal based fermentation products for health and nutrition 2001-2004	Grant-in-aid	14.41	Co-PI
16.	Development of technology for the production of natural colorants with special reference to astaxanthin from green alga-Haematococcus Pluvialis 2000-2003	Grant-in-aid	34.00	Co-PI
17.	Scale-up of hairy root cultures in specially designed bioreactors and Downstream processing for the reproduction of high value phytochemicals and creation of pilot plant facility 1997-2000	Grant-in-aid	22.00	Co-PI
18.	Solid state fermentation for the production of enzymes for food processing 1990 –1995	Grant-in-aid	50.00	Co-PI
19.	Development of concentrated aromatic bases of mango for developing countries and their export markets 1994-1999	EU project Grant-in-aid	32	Member
20.	Food Engineering centre 1998	Grant-in-aid	500	Member
21.	Studies on the development of coconut milk based consumer products 1994	Grant-in-aid	12	Co-PI
22.	Development of biosensors for assessing microbiological quality of foods & monitoring of formaldehyde concentration in selected marine foods	GAP-373	ADA-NPMASS (DRDO)	Co-Principle Investigator
23.	Field assisted processing of vegetables and spices for improved quality	GAP-388	DST	Co-Principle Investigator
24.	Development of wet cum dry grinder for grinding waxy rice of Assam	GAP-417	DST, CSIR-CFTRI, Tezpur University	Member
25.	Biotechnological approaches to regulate fermentation and drying process of cocoa	GAP-422	DST MFPI, CSIR-CFTRI	Member
26.	Design and development of vacuum frying system for the production of health snack products	GAP-413	DST	Member
27.	Ultrasound assisted ozonator for the processing of liquid foods.	GAP-416	DST, CSIR-CFTRI	Member

Sponsored projects				
1.	Preservation of sugar cane juice in PET bottles (SSP 0166) 2011-2012	Sponsored M/s Progress Culktivation Ltd., Kolkatta, West Bengal.	6.06	Member
2.	A process for the development of powder from dilute fructo oligo saccharide (FOS) solution. (SSP 0163) 2011-2012	Sponsored	5.2	PI
3.	Development of process for preparation of liquid asafetida (SSP 0156) 2010-2011	Sponsored M/s Mahesh Elastomers Private Limited, Madurai.	11.00	Member
4.	Development of shelf stable sugar cane juice concentrate (SSP 0133) 2006 –2007	Sponsored	7.69	Co-PI
5.	Development of tender coconut jam (SSP 0132) 2006 –2007	Sponsored	1.00	Co-PI
6.	Preservation of sugar cane juice in PET bottles (SSP 0166) 2011-2012	Sponsored		Member
7.	Standardization of preparation of Aravana and Appam	SSP-177	TDB-Trivandrum	Member
8.	Standardization of process parameters for spray drying of Fructooligo Saccharides,	SSP -163	TATA innovation center, TCL-PUNE	Member