


## Dr. Sangeeta Kale

	Name	<b>Dr. Sangeeta Kale</b>
	Designation	Director (Policy & Planning) Professor and Dean (Academics)
	DOB	23-09-1967
	Highest Qualification	Ph.D. (Physics)
	Total Citations	3788
	h-index	29
	i-index	60
	e-mail	<a href="mailto:sangeetakale@diat.ac.in">sangeetakale@diat.ac.in</a>
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	Mobile	Option
	Home page	<a href="http://www.">http://www.</a>

Dr Sangeeta Kale, graduated from University of Pune, India and did her Masters in Electronic-Science and Doctoral studies in Material Science from same university in 1996. She did her post-doctoral studies from University of Maryland, College Park, U.S.A. from 2000 to 2002. She has been working at Defence Institute of Advanced Technology, as Professor and Dean of this University. Additionally, she has been a visiting Scientist at International Centre for Theoretical Physics, since 2006, till date, at Trieste, Italy. At the research front, she works on nanomaterials for their sensing and biomedical applications, typically pertaining to Defence research. Her work includes Nanotechnology and its applications in the domain of CBW sensors, electromagnetic shielding for Radars, optical sensors for field detections, metamaterials for smart detections and drug delivery using nanomaterials.

Additionally, she also has incubated a Company at DIAT Innovation and Incubation Centre, called Navyukti Innovations Pvt. Ltd. which works on Sensors, Drug Delivery vehicles and Devices. She works as the Founder and Co-Director of this Company, registered at DIAT-IIC.

### Education

Year	Degrees
1987 – Distinction	<b>B.Sc (Physics)</b>
1989 – Rank 3 <sup>rd</sup> in University	<b>M.Sc. (Electronic Science)</b>
1996	<b>Ph.D (Physics)</b>
2000-2002 (total duration of 1.5 years - 3 discrete visits)	<b>Postdoctoral Research (Physics)</b>
2014-2020	<b>Visiting Senior Scientist (Senior Associate)</b>

<b>Professional Experience (Institution, Position and Period)</b>		
1	<b>Director (Policy &amp; Planning)</b>	1 <sup>st</sup> January 2021 - till date
1	<b>Dean (Academics), DIAT (DU)</b>	1 <sup>st</sup> January 2019 - 31 December 2020
2	<b>Dean (Student Affairs), DIAT (DU)</b>	28 <sup>th</sup> Sept 2017 – Dec 2019
3	<b>Head (Materials Management Group), DIAT (DU)</b>	23 <sup>rd</sup> August 2017 - Dec 2019
4	<b>Officiating Vice Chancellor</b> , Defence Institute of Advanced Technology (DIAT) (Deemed University supported by Ministry of Defence)	11 <sup>th</sup> August, 2014 to 3 <sup>rd</sup> February, 2015
5	<b>Dean (Academics), DIAT (Deemed University)</b>	22-03-2013 to 21-03-2015
6	<b>Chairperson</b> , Doctoral Research Committee (DRS)	01-04-2015 to 23-08-2017
7	<b>Head</b> , Department of Bio-Sciences & Technology	07-12-2012 to 19-09-2016
8	<b>Head</b> , Department of Applied Physics	29-03-2011 to 16-09-2016
9	<b>Chairperson</b> , Post Graduate Committee	March 2011 to March 2013
10	<b>Chairperson</b> , Vigilance Cell	Since 2018
11	<b>Chairperson</b> , Women's Complaint Committee	January 2013 onwards, till date

<b>Research Domains</b>
<ul style="list-style-type: none"> <li>• <b>Sensors : CBW and field Sensors, electromagnetic sensors, metamaterial sensors</b></li> </ul>
<ul style="list-style-type: none"> <li>• <b>Nanomaterials for electromagnetic shielding</b></li> </ul>
<ul style="list-style-type: none"> <li>• <b>Devices: Sensors, photonic devices</b></li> </ul>
<ul style="list-style-type: none"> <li>• <b>Drug Delivery and Bio-devices</b></li> </ul>

<b>Specific Projects</b>
<ul style="list-style-type: none"> <li>• <b>Design and fabrication of wide-band rejection shields using multilayers of periodic resonator arrays and carbon-based nanocomposites – DST (ongoing)</b></li> </ul>
<ul style="list-style-type: none"> <li>• <b>Development of SOx/NOx derivatives gas sensors using nanomaterials-functionalised ring resonators - BRNS (ongoing)</b></li> </ul>
<ul style="list-style-type: none"> <li>• <b>DIAT-DRDO Programme on Nanomaterials: Nanomaterials for Defence Applications: Coatings, Devices and Healthcare. – DRDO (completed)</b></li> </ul>
<ul style="list-style-type: none"> <li>• Cross-linked polymeric cages for encapsulation and sustained release of nanomaterials /drugs – DST (completed)</li> </ul>
<ul style="list-style-type: none"> <li>• Metal oxide-Polymer nanocomposites for detection of gas pollutants in Sugar industries : DST (completed)</li> </ul>
<ul style="list-style-type: none"> <li>• To synthesize self- assembled oriented nanomagnetic particles in thin film form and study its property regime : UGC-DAE-CSR (completed)</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Synthesis and testing of manganite- semiconductor based microdevices : DST (completed)</b></li> </ul>
<ul style="list-style-type: none"> <li>• Synthesis and property study of semiconducting oxides with magnetic nanocluster inclusions, for their possible applications in various sensing devices. : ISRO (completed)</li> </ul>
<ul style="list-style-type: none"> <li>• Synthesis and Characterization of Bulk Ferromagnetic Semiconductor Oxide Materials : UGC (completed)</li> </ul>
<ul style="list-style-type: none"> <li>• Synthesis of bulk and thin films of diluted magnetic semiconductors and investigation of their electrical, optical and magnetic properties for various sensing applications : ISRO (completed)</li> </ul>

<b>Research Collaborations</b>
<p>Synthesis and Surface Modification of Iron oxide Nanoparticles (NPs) - KHYS-GASTSTIPENDIUM   ANTRAG  Antrag auf Gewährung eines KHYS-Gaststipendiums : Dr. Ljiljana Fruk  Karlsruhe Institute of Technology (KIT)  DFG-Centre for Functional Nanostructures  Wolfgang Gaede  Karlsruhe, Germany</p>
<p>Investigation of the surface properties in nanostructured thin films of doped wide-band-gap semiconductors: Eiffel Fellowship for my student, Sandip Dhobale  Prof. Béatrice HANNOYER, Pr. University of Rouen, Cedex-FRANCE</p>

## Ph.D Thesis Supervision

Sr. No.	Name of Student	Degree	Title of thesis	Date of registration	Name of University and date of award
1.	Mona Jani	Ph.D. (Physics)	Manganite Nano particles: Synthesis & Applications	Completed and awarded Ph.D. on 18 <sup>th</sup> February, 2010	Pune University <b>Completed</b>
2.	Shadie Hatamie	Ph.D. (Physics)	Synthesis of Metal & Metal Oxide Nano particles for possible applications	Completed and awarded degree on 2 <sup>nd</sup> September, 2011	Pune University <b>Completed</b>
3.	Rohini Kitture	Ph.D. (Physics)	Synthesis of Oxide Semiconductor Nano Materials for Degradation of Dyes	24.03.2008 awarded degree on 30 <sup>th</sup> December, 2013	Pune University <b>Completed</b>
4.	Sandip Dhobale	Ph.D. (Physics)	Metal Oxide Nano Materials for Chemical & Biological Sensing	17.10.2008 awarded degree on 25 <sup>th</sup> February, 2014	Pune University <b>Completed</b>
5.	Shilpa Kaskar	M. Phil. (Electronic-Science)	To Explore Nano Materials for Solar Cell Applications	03.10.2008 <b>Completed M.Phil. on 15<sup>th</sup> April, 2013</b>	Pune University <b>Completed</b>
6.	D. P. Londhe	M. Phil. (Electronic-Science)	Approach to magnetic sensors using manganite nano particles	April 2007 <b>Completed and awarded M.Phil. on June 22, 2009</b>	Pune University <b>Completed</b>
7.	Rupali Waichal	M.Sc. (PPPR) (Electronic-Science)	Synthesis and characterization of cuprous oxide nanoparticles synthesized by electrochemical method and its application as a Humidity sensor	25.07.2009 <b>Completed and awarded degree on 27<sup>th</sup> August, 2012</b>	Pune University <b>Completed</b>
8.	Nageswar a Rao	Ph.D. (Physics)	Fiber optics based Magnetic/ Electric field sensors using Nanomaterials	degree 15 <sup>th</sup> May, 2015	DIAT <b>Completed</b>
9.	Umesh Nakate	Ph.D. (Physics)	Metal oxide nanostructures for gas sensing and photo catalytic applications	10-52-031 <b>Completed and degree awarded on 6<sup>th</sup> April 2016</b>	DIAT <b>Completed</b>
10.	B. Vijaya Bhaskara Rao	Ph.D. (Physics)	Nanomaterials for applications in drug delivery (Sponsored candidate on my project given by Department of Science and Technology)	Since October 2011 <b>Completed and degree awarded on 16<sup>th</sup> October 2017</b>	DIAT
11.	Shankar Gaware	Ph.D. (Physics)	Nanomaterials-based Biosensors and sustained drug delivery	Since July 2012	DIAT

				<b>Pre-synopsis submitted in October 2017</b>	
12.	Vaishali Rawat	Ph.D. (Physics)	Metamaterials : fabrication and testing	Since July 2012 <b>Completed and degree awarded on 17<sup>th</sup> October 2017</b>	DIAT
13.	Dyandeo Pawar	Ph.D. (Physics)	Optical Fiber based sensing	Since July 2013 <b>Completed 2019</b>	DIAT
14.	Preetam Bala	Ph.D. (Bio Sciences and Technology)	Nanomaterial drug complexes for wound healing	Since July 2013 <b>Completed 2020</b>	DIAT
15.	Chetan Chavan	Ph.D. (Bio Sciences and Technology)	Nanomaterials drug complexes for therapeutic applications	Since July 2014 <b>Completed 2021</b>	DIAT
16.	Rajat Srivastava	Ph.D. (Physics)	TBC	Since June 2020	DIAT
17.	Shravani Kale	Ph.D. (Physics)	TBC	Since June 2019	DIAT
18.	Vivek Kale	Ph.D. (Physics)	Hazardous molecules sensing using metamaterial-based resonators	Since June 2018	DIAT
19.	Wg. Cmdr. Bijoy Nair	Ph.D. (Physics)	TBC	Since June 2021	DIAT

### M.Tech. Dissertation Supervision

Sr. No.	Name of Student	Degree	Title of thesis	Date of Commencement and Completion	Name of University
1.	Swati Gupta	M.Tech Project	Incorporation of nanofluids in Optical fibers for sensing applications	June 2010 to April 2011	DIAT University
2.	Wg. Comm. Walasang	M.Tech Project	Laser Communication for last leg signaling	June 2010 to April 2011	DIAT University
3.	Anupam Bharadwaj	M.Tech Project	Lithium Niobate nanoparticles for electro-optic applications	July 2011 to June 2012	DIAT University
4.	Hamanjeet Singh	M.Tech Project	Laser-assisted synthesis and manipulation of nanomaterials	July 2011 to June 2012	DIAT University
5.	Sandip Khatri	M.Tech. Project	Graphitic oxides and Indium oxide based optical sensors	July 2012 to May 2013	DIAT University
6.	Anusree Kandoth	M.Tech. Project	Optical fiber based sensors	July 2012 to May 2013	DIAT University
7.	Tuhina Oli	M.Tech. Project	UWB antenna design and testing	July 2013 to May 2014	DIAT University
8.	Sreevalsen	M.Tech. Project	Optical fiber based sensors for SHM applications	July 2013 to May 2014	DIAT University (done at RCI Hyderabad)

9.	Vihang Nadkarni	MTech Project	Metamaterials for applications in sensors	July 2014 to May 2015	DIAT University
10.	Jena Maheshwar	MTech Project	Nanomaterials for EMI applications	July 2014 to May 2015	DIAT University
11.	GNVS. Kasi V Rao	M.Tech Project	Laser guided landing of a UAV	July 2015 to May 2016	DIAT University
12.	Rucha Sarwandhya	ME student	Development of electronics for metamaterial sensors.	July 2015 to May 2016	Pune University
13.	Debika Debnath	M.Tech Project	Development of drug conjugated gold nanoparticles for H1N1 infections and sensing	July 2015 to May 2016	DIAT, along with IGIB, New Delhi
14.	Shiniwas Mane	M.Tech Project	Active Indicator Based Fiber Optic Gas Sensor	July 2015 to May 2016	DIAT
15.	Nihar Vaish	M.Tech Project	Nanomaterials functionalized metamaterials for selective gas sensing	July 2016 to May 2017	DIAT
16.	Ankit Malviya	M.Tech Project	FBG sensors for structural health monitoring : torsion measurements	July 2016 to May 2017	DIAT
17.	Abhay Yadav	M.Tech Project	Plasmonic based SPR sensors for CBW diagnostics	July 2017 to May 2018	DIAT (parent organization : DRDO)
18.	Farooq A. Dar	M.Tech Project	Plasmonic based SPR sensors for CBW diagnostics	July 2017 to May 2018	DIAT (parent organization : DRDO)
19.	Sweta Rath	M.Tech. (Sensor Technology)	Design and Development of a Resonator based Bio-sensor for Detection of NS1 Antigen	August 2018 – May 2019	Parent University : DIAT University
20.	Pradipta Datta	M.Tech. (Sensor Technology)	Pulsed laser deposited Lithium niobate thin films and study of their non-linear properties	August 2018 – May 2019	Parent University : DIAT University
21.	Rajat Srivastava	M.Tech. (Sensor Technology)	SAW Devices for Sensing	July 2019- May 2020	DIAT
22.	Srijeet Srivastava	M.Tech. (Sensor Technology)	Machine learning and AI development for metamaterial-based sensor	July 2019- May 2020	DIAT
23.	Anagha Gayathri	M.Tech. (Sensor Technology)	Lithium Niobate based photonic devices : fabrication and testing	July 2019- May 2020	DIAT
24.	Abhilash Reddy	M.Tech. (OCP)	Development and Testing of smart Pulse Oximeter	July 2020- May 2021	DIAT
25.	Aniket Wankhede	M.Tech. (OCP)	Working with SAMEER-Mumbai	July 2020- May 2021	DIAT
26.	Shwetha P.	M.Tech. (Sensor Technology)	Working with NPOL-Kochi	July 2020- May 2021	DIAT
27.	Vaibhav Sharma	M.Tech. (LEOC)	Simulation of photonic devices	July 2020- May 2021	DIAT
28.	Ankit Bharadwaj	M.Tech. (ST)	Development of IOT based sensor for health monitoring	July 2021 – May 2022	DIAT

**Summer/Winter Internships From other institutions Supervision**

Sr. No.	Name of Student	Degree	Title of work done at DIAT	Date of Commencement and Completion	Name of University
1.	Fahad Alam	M.Tech – Nanotechnology student	Nanofluids for biomedical applications	May 16 – July 15, 2011	Parent Institute, AMU, India
2.	Dhaval Suri	M.Sc. Physics student of Pune University	Metamaterials: synthesis and applications	November 2011 to March 2012	Parent University: Pune University, Pune
3.	S Abraham Sampson	M.Tech – Nanotechnology Final year Dissertation work	Oxide nanoparticles for sensing toxic gases	January 2012 till June 2012	Parent University : NIT Kurukshetra
4.	Kalyani Chordia	M.Sc. Student from Fergusson College	Synthesis and testing of Raktchandan:ZnO / TiO <sub>2</sub> nanoparticles for therapeutics	March 2012 till date	Parent University : Pune University
5.	Students of Dr. Pant, Garware college	M.Sc. students from AG college	Microwave synthesis and applications of Lithium Niobate	August 2012 – July 2013	Parent University : Pune University
6.	Pankaj kumar Yenepe	M.Sc. Student from Fergusson College	Manganite doped carbon-based systems for spintronics applications	October 2013 – December 2013	Parent University : Pune University
7.	Harshita S.	Master's Student in at Center for Atomic and Molecular Physics	Studies on non-linear optical properties of photonics materials at nano-level	Jan 2014 – May 2014	Parent University: Manipal university, Manipal
8.	Sagar Shende	M.Sc. Photonics	Fabry-Perot Interferometer Based Voltage Tunable Electro Optic sensor using LiNbO <sub>3</sub> for Probable industrial Applications	Jan 2014 – March 2014	Parent University: DEPARTMENT OF PHYSICS (Photonics)  RAJARSHI SHAHU MAHAVIDYALAYA, LATUR
9.	Prashant Pimpliskar	Student (4th year), Centre for Converging Technologies,	Using Zinc Oxide nanoparticles and assemblies for biosensing applications	With Anup Kale  Feb 2014 – July 2014	Rajasthan University, Jaipur
10.	Pavitra S.R.	Master's Student in at Center for Atomic	Studies on lanthanum tantalate non-linear optical properties of	With Dr. Ravikant Choubey	Parent University: Manipal

		and Molecular Physics	photonics materials at nano-level	June 2014 – August 2014	university, Manipal
11	Deepika Bharatula	B.Tech 2nd Year	Studies on metamaterials and nanomaterials for sensing applications	July 2014 – August 2014	SRM University Chennai
10.	Ashish Awasthi	Student (4th year), Centre for Converging Technologies	Nanomaterials for drug delivery and biosensing	August 2014 – Feb 2015	Rajasthan University, Jaipur
11	Dhiraj Bhavsar	Completing PhD from SASTRA Univ.	Nanomaterials for drug delivery	August 2014 onwards – March 2015	SASTRA Univ.
12.	Pavitra S.R. (applied again for 2 <sup>nd</sup> tenure)	Master's Student in at Center for Atomic and Molecular Physics	Tunable refractive index and distributed evanescent field modulation in PCF for fuel adulteration sensor	With Dr. Ravikant Choubey Jan 5, 2015 – May 18, 2015	Parent University: Manipal university, Manipal
13.	Varun Nair	Master's student in Dept of Physics and Nanotechnology.	Nanomaterials for EMI/EMC applications	Since May 2015 – July 2015	Parent University: SRM University, Kanchipuram
14.	Vishwanath	Master's student in Dept of Physics	Study of H <sub>2</sub> S sensing using Gold nanoparticles via metamaterial approach	October 2015 – March 2016	Parent University: Fergusson College, Pune University
15.	Mithali K Chengappa	M.Tech. Materials Science	Carbon nanocomposites for drug delivery applications	February 2016 – March 2017	Parent University: University of Mysore
16.	Swapneel Thakkar	M.Tech. Materials Science	Carbon nanocomposites for EMI/EMC	February 2016 – March 2017	Parent University: University of Mysore
17.	Rucha Sarvadnya	M.E. – Electronics	Design and Development of electronics for metamaterials sensor	Jan 2016 – June 2016	Parent University: Pune University
18.	Kasturi Rokade	M.Sc. – Nanotechnology	Si-based nanomaterials for Drug Delivery and imaging applications	August 2017 – June 2018	Parent University : Kolhapur University
19.	Ashutosh Kinikar	B.E. E&TC	Managnetic nanomaterials with Optical Fibers for low-magnetic fieldsensing	August 2017 – May 2018	Parent University : Pune University
20	Pratik Bhagwat	M.Sc. Physics	Carbon nanocomposites for EMI/EMC	August 2018 – May 2019	Parent University : Pune University
21	Siddhi Shedge	M.Sc. Physics	Drug-loaded Au/Ag nanoparticles for enhanced antimicrobial activity	August 2018 – May 2019	Parent University : Pune University

22	Soniya Prabhune	M.Sc. Physics	Cancer therapeutics using drug loaded Au/Ag nanoparticles	August 2018 – May 2019	Parent University : Pune University
23	Kaushik Yeola	M.Sc. Physics	Graphene and porous silica based polymer composites for electromagnetic shielding	August 2018 – May 2019	Parent University : Pune University
24	Pratik Bhagwat	M.Sc. Physics	Carbon nanocomposites for EMI/EMC	August 2018 – May 2019	Parent University : Pune University
25	Swapnali Rabade	M.Sc. Physics	Metal Oxide based sensors	August 2019 – May 2020	Parent University : Kolhapur University
26	Anushka Mahadik	M..Tech. BioTechnology	Drug-mediated synthesis and delivery studies	August 2019 – May 2020	Parent University : MIT-ADT University
27.	Ashima Khanna	M..Tech. BioTechnology	Chitosan-Curcumin based systems for antimicrobial testing	August 2019 – May 2020	Parent University : MIT-ADT University
28.	Saipriya Kurapati	M..Tech. BioTechnology	Microneedle-based drug delivery system	August 2019 – May 2020	Parent University : MIT-ADT University
29.	Ashlesha Mahadar	M..Tech. BioTechnology	Microneedle-based drug delivery system	August 2019 – May 2020	Parent University : MIT-ADT University
30	Anish and Sourav	M.Sc. Physics	Venom detection using metal oxide nanoparticles	August 2019 – May 2020	Parent University : Pune University – Modern College
31	Urvi Ghatpande	M.Sc. Biotechnology	Nanomaterials for antibacterial detections	August 2020 – July 2021	Parent University : Pune University – Fergusson College
32	Prajakta Kulal (under Navyukti Innovations Pvt. Ltd)	M.Tech. (Chemical Technology)	Development of nanoparticles for antimicrobial applications	July 2021 to May 2022	Parent University: SPPU – Sinhad Institute of Technology
33	Shruti Joshi (under Navyukti Innovations Pvt. Ltd)	M.Tech, (BioTechnology)	Development of green solution for drug delivery applications	December 2021 to June 2022	Parent University : MIT-ADT, Pune

**Other Supervision : --**

#### Research Publications from 2010 to 2020

Books	Total Journals	Articles published	Books	Articles	Registered
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	Articles	in SCOPUS / Web of Science Index Journals	Chapter	published in the Conference Volumes	Patent
4	121	110	4	5	1

## Research Publications,

### Journal Articles

- 121 Studies on drug-assisted silver nanoparticles to reduce granulocytopenia and improve drug delivery for cancer therapy  
C Chavan, S Prabhune, S Shedje, R Patwardhan, S Kamble, AVR Murthy, ...  
Applied Physics A 127 (5), 1-12, 2021
120. Sorption of brilliant green dye using soybean straw-derived biochar: characterization, kinetics, thermodynamics and toxicity studies  
G Vyavahare, R Gurav, R Patil, S Sutar, P Jadhav, D Patil, YH Yang, S.N. Kale et.al.  
Environmental Geochemistry and Health, 43, pages 2913–2926 (2021) I.F. 4.609
- 119 Comparative evaluation of MAX, MXene, NanoMAX, and NanoMAX-derived-MXene for microwave absorption and Li ion battery anode applications  
Arundhati Sengupta, B. V. Bhaskara Rao, Neha Sharma, Swati Parmar, Vinila Chavan, Sachin Kumar Singh, Sangeeta Kale, Satishchandra Ogale  
*Nanoscale*, 12, 8466, 2020
- 118 Chemical etching of glasses in hydrofluoric Acid: A brief review  
A Jayarama, GK Kannarpady, S Kale, S Prabhu, R Pinto  
Materials Today: Proceedings (<https://doi.org/10.1016/j.matpr.2021.12.110>)
- 117 Resonance-based detection of perilous sulphur dioxide using TiO<sub>2</sub> nanoparticles and unit-cell ring resonator  
Kale, V., Chavan, C., Bhongale, C., Girija, K.G., Kale, S.N.  
Sensors and Actuators, A: Physical, 2021, 331, 112898
- 116 Fe<sub>3</sub>O<sub>4</sub>-mediated dielectric sensor using metamaterial-inspired resonators for the NO<sub>2</sub> sensing  
Vivek Kale, Chetan Chavan, Dhanashree Sable, K.G. Girija, Shaibal Banerjee, S.N. Kale  
Applied Physics A  
DOI: 10.1007/s00339-020-03905-8
- 115 Electric field controlled near-infrared high-speed electro-optic switching modulator integrated with 2D MgO  
Ch. N. Rao, Dnyandeo Pawar, Umesh T. Nakate, Radhemanohar Aepuru, XingGao Gui, Ramalinga V. Mangalaraja, S. N. Kale, Eun-kyung Suh, Wenjun Liu, Deliang Zhu, Youming Lu, and Peijiang Cao  
Optics Letters Vol. 45, pp. 4611-4614 (2020) <https://doi.org/10.1364/OL.393796>
- 114 High-performance dual cavity-interferometric volatile gas sensor utilizing Graphene/PMMA nanocomposites,  
DnyandeoPawar, Rajesh Kanawade, Ajay Kumar, Ch N Rao, Peijiang Cao, Shankar Gaware, Dattatray Late, Sangeeta N Kale, ST Navale, WJ Liu, DL Zhu, YM Lu, Ravindra K Sinha,  
Sensors & Actuators: B. Chemical 312, 127921 2020
- 113 Ampicillin-mediated functionalized gold nanoparticles against ampicillin-resistant bacteria: strategy, preparation and interaction studies,  
Chetan Chavan, Sagar Kamble, AVR Murthy, S.N. Kale,  
Nanotechnology 31 215604, 2020 (2020).
- 112 Microneedles of chitosan-porous carbon nanocomposites: Stimuli (pH and electric field)- initiated drug delivery and toxicological studies. DOI: 10.1002/jbm.a.36672, 13  
Shankar A. Gaware, Kasturi A. Rokade, Preetam Bala, Sangeeta N. Kale  
Journal of Biomedical Materials Research – Part A, 107, 1582-1596, 2019

- 111 Manifestations of Nanomaterials in Development of Advanced Sensors for Defense Applications, Rohini Kitture and Sangeeta Kale, Springer Nature Switzerland AG 2019 Y. Mahajan, R. Johnson (eds.), Handbook of Advanced Ceramics and Composites, [https://doi.org/10.1007/978-3-319-73255-8\\_2-1](https://doi.org/10.1007/978-3-319-73255-8_2-1)
110. Enhanced sensitivity of magneto-optical sensor using defect induced perovskite metal oxide nanomaterial  
Ch N.Rao, Piyush Dua, Piyush Kuchhal, Youming Lu, S.N.Kale, PeijiangCao, [Journal of Alloys and Compounds](#), **797**, 2019, 896-901
- 109 A review on nanomaterial-modified optical fiber sensors for gases, vapors and ions  
Dnyandeo Pawar & Sangeeta N. Kale, *Microchimica Acta* (2019) 186:253  
<https://doi.org/10.1007/s00604-019-3351-7>,
- 108 Self-Assembled Pullulan Acetate Nanoparticles for pH-Dependent Controlled Drug Delivery Application, Preetam Bala and Sangeeta N. Kale, *Advanced Science, Engineering and Medicine* Vol. 11, 1–8, 2019  
[www.aspbs.com/asem](http://www.aspbs.com/asem) (in press)
107. Silica-chitosan nanocomposite mediated pH-sensitive drug delivery-Shankar A. Gaware, Kasturi A. Rokade, S.N. Kale, *Journal of Drug Delivery Science and Technology*, **49**, 345, 2019
106. Fe<sub>3</sub>O<sub>4</sub>-decorated graphene assembled porous carbon nanocomposite for ammonia sensing: Study using optical fiber Fabry-Perot Interferometer  
Dnyandeo Pawar, BV Bhaskara Rao, S.N. Kale  
*Analyst*, 2018, **143**, 1890 – 1898
105. Systematic magnetic fluid hyperthermia studies of carboxyl functionalized hydrophilic superparamagnetic iron oxide nanoparticles based ferrofluids, G. Kandasamy, Atul Sudame, Piyush Bhati, Anandita Chakrabarty, S.N. Kale, Dipak Maity, *Journal of Colloid and Interface Science*, **514**,534-543, 2018
104. Nanomaterial-Functionalized-Metamaterial-Inspired Resonators for Ultra-Sensitive and Selective H<sub>2</sub>S Sensing, Vaishali Rawat, Shreeram Joglekar, S. N. Kale, *IEEE Sensors proceedings*1045, 2018
103. Low Magnetic Field Sensing Using Manganite (La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub>) nanoparticles with Optical Fiber Interferometric Approach, Asutosh Kinikar, Dnyandeo Pawar, S N Kale, *IEEE Xplore* ,1048, 1048, 2018
102. Observation of magnetism in La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub>—graphene nanoribbons complex: a probable magnetoelectronic material study, Anupama Joshi, Suwarna Datar and S N Kale, *Mater. Res. Express* **4** (2017) 075050
101. Nanomaterials as Enhanced Antimicrobial Agent/Activity Enhancer for Transdermal Applications: A Review Sangeeta N. Kale, Rohini Kitture, Sougata Ghosh, Balu A. Chopade, Jatinder V. Yakhmi, Chapter 11, Page 279, *Antimicrobial Nanoarchitectonics* <http://dx.doi.org/10.1016/B978-0-323-52733-0.00011-2>. Book Chapter in the Book entitled *Antimicrobial Nanoarchitectonics – from Synthesis to applications*. Edited by Alexandru Mihai Grumezescu – Elsevier Publications.
100. B V Bhaskara Rao, Mithali Chengappa and S N Kale “Lightweight, flexible and thin Fe<sub>3</sub>O<sub>4</sub>-loaded, functionalized multi walled carbon nanotube buckypapers for enhanced X-band electromagnetic interference shielding” *Mater. Res. Express*, 2017, **4**, 045012
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98. Sohini Roy Choudhury, Vaishali Rawat, A.H. Jalal, S.N. Kale, Shekhar Bhansali “Recent advances in electric metamaterial split-ring-resonator circuits as biosensors and therapeutic agents” *Biosensors and Bioelectronic*, 2016, **86**, 595
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## Book Chapters

(Format: Author/s, Title of Article. In, "Title of the Book" Edited by -----, Place of Publication, Publisher, Year of Publication. Pages.

Sr.No.	Name of Book Chapters	Author (s)	Year	Publisher
1.	Magnetic nanoparticles for biomedical applications	Dr. S.N. Kale (Co-authored with SB Ogale, A.Kale, S. Kale)	2011	American Scientific Publishers Book Chapter Number 9, page 1-18, "Applications of Nanomaterials" 2012. ISBN: 1-58883-181-7
2.	Zinc oxide nanomaterials as amylase inhibitors and for water pollution control	Rohini Kitture, Sandip Dhobale and S.N. Kale*	2012	"Springer Series in Materials Science" entitled "ZnO Nanocrystals and Allied Materials" Book ISBN: 978-81-322-1159-4, Chapter No. 13, Page 1-19, 2013

3.	Nanomaterials as enhanced antimicrobial agent/activity-enhancer for transdermal applications: A review	<b>S.N. Kale*</b> , Rohini Kitture, Sougata Ghosh, Balu A. Chopade, J.V. Yakhmi	2017	Chapter 11, Antimicrobial Nanoarchitectonics <a href="http://dx.doi.org/10.1016/B978-0-323-52733-0.00011-2">http://dx.doi.org/10.1016/B978-0-323-52733-0.00011-2</a> , 2017, Page 279 – 322, Elsevier Publications
4.	A review on nanomaterial-modified optical fiber sensors for gases, vapors and ions	Dnyandeo Pawar & Sangeeta N. Kale.	2019	Microchimica Acta <a href="https://doi.org/10.1007/s00604-019-3351-7">https://doi.org/10.1007/s00604-019-3351-7</a> Springer-Verlag GmbH Austria, part of Springer Nature 2019 <b>volume 186</b> , Article number: 253 (2019)
5.	Handbook of Advanced Ceramics and Composites –: Manifestations Of Nanomaterials In Development Of Advanced Sensors For Defence Applications	<b>Rohini Kitture and Sangeeta N Kale</b>	2019 (In press)	Springer Nature 2019

### Invited Talks

Name and Place	Year
63. Keynote Address and Talk at International Conference on Recent Trends in Biotechnology (ICRTB 2022) on topic entitled “From Research to product-in-market: A classic story in Indian context”	12-13 February, 2022
62. Guest of Honor talk at Indian International Science Festival (IISF-2020), New Delhi (Online platform).	22 <sup>nd</sup> December 2020
61. Invited talk at IEEE-Sensors 2018, entitled “Nanomaterial-Functionalized-Metamaterial-Inspired Resonators for Ultra-Sensitive and Selective H <sub>2</sub> S Sensing” at Pullman, Aerocity, New Delhi	December 2018
60. Talk at 62 <sup>nd</sup> DAE Solid State Physics Symposium, “Nanomaterials - functionalised Optical Fiber based sensors for Chemical-Biological hazard diagnostics” at BARC, Mumbai	December 26-30, 2017
59. Talk at EMN Conference on Multifunctional Hybrids and Nanomaterials, entitled “Exploring electromagnetic responses of nanocomposites as absorbers” at Radisson Celebration, Orlando, USA	4-8 December, 2017
58. Invited Talk at National Symposium on Radiation and Photochemistry (NSRP-2017), entitled “Radio-frequency Electrical Metamaterial Sensors for Hazardous Environment Detections” Manipal University, Mangalore, India	March 2-4, 2017
57. Invited Talk at “IEEE Sensors” Conference, entitled “Optical Fiber manipulations using nanomaterials : A way towards miniaturised smart sensors” at Orlando, Miami, USA	30 <sup>th</sup> October 2016
56. Invited Talk entitled “Novel composites as radio-frequency absorbers in Radar technology” at Shiv Nadar University, New Delhi.	15 <sup>th</sup> September, 2016
55. Invited Talk at 2 <sup>nd</sup> Mumbai-Pune Semiconductor Meeting entitled “Exploring wide band gap semiconductors along with Optical Fibers for sensing applications” at IISER Pune	12 <sup>th</sup> March, 2016
54. Invited Talk at Indian Science Congress 2016 entitled “Nanotechnology based smart sensors for surveillance, stealth and environmental hazard detections” University of Mysore, India	3-7 January, 2016

53. Invited Talk entitled "Carbon- nanocomposites as radio-frequency absorbers for applications in stealth and electromagnetic shielding"at 4th International Conference on Advanced Nanomaterials and Nanotechnology (ICANN2015), in Guwahati-Assam, India	08-11 December 2015
52. Director's Talk at Third Conference on Nanotechnology for Biological and BioMedical Applications (Nano-Bio-Med 2015), entitled "Nanomaterials for theranostics and drug delivery" at IIT-Mumbai, India	December 01-04, 2015
51. Invited talk at International Baltic Conference on Magnetism (IBCM 2015) entitled "Nanocomposites for radio frequency applications" at Kaliningrad, Russia	30 <sup>th</sup> Aug – 3 <sup>rd</sup> September 2015
50. Invited talk at "Symposium on Recent Advances in Photonics"- entitled "Optical Fiber manipulations using nanomaterials for sensing applications" at Manipal University, India	08 <sup>th</sup> August 2015
49. Invited Talk at IOM, Elettra Campus on "Detection of low fields using optical Fiber based sensors" at Elettra, ICTP, Italy	04 <sup>th</sup> May, 2015
48. Invited Talk at International Conference on Metallurgical Coatings and Thin Files (ICMCTF-2015) on 'Nanomaterials for applications in Health care" at San Diego, USA	20-24 April, 2015
47. Invited Talk entitled "Low field detections using nanomaterials-manipulated Optical Fiber based sensors" at Nano India 2015, at Sastra Univeristy, Thanjavur	29-30 January, 2015
46. Invited Talk entitled "Functional Nanomaterials for cancer hyperthermia and drug Delivery" at International Symposium on Nanotechnology and Cancer (ISNACT 2015, IIT-Bombay	19-21 January, 2015
45. Invited talk at UGC-DAE-CSR, Indore on "Advanced functional materials for applications in Defence"	20 <sup>th</sup> June 2014
44. Invited Talk at International Conference on Optics and Optoelectronics' (ICOL-2014) at Instruments Research & development Establishment, Dehradun, Uttarakhand, India on the topic entitled "Use of magneto-optic nanomaterials for optical-fiber based sensing"	05-08 March 2014
43. MRSI Medal talk at IISc, Bangalore on "Tuning the property-space and assembly of hybrid conjugates for healthcare applications; especially for cancer hyperthermia and controlled-drug-release"	12-14 Feb. 2014
42. Invited talk at 3rd International Conference on <b>Advanced Nanomaterials and Nanotechnology (ICANN-2013)</b> entitled "Electrical-Interference-independent low field magnetic sensing using Optical Fiber based nanosensors" <b>between 1-3 December 2013</b>	1 <sup>st</sup> to 3 <sup>rd</sup> December, 2013
41. Invited talk at University of Southern California (USC), CA entitled "Electrical-Interference-independent low field magnetic sensing using Optical Fiber based nanosensors" on 25 <sup>th</sup> October, 2013, at USC, CA, USA	25 <sup>th</sup> October, 2013
40. Directors talk at NanoBiomed2013 between entitled "Hybrid (complexes of natural organic extracts and inorganic materials) conjugate assemblies for drug release and therapeutics" between 14-18 October, 2013, at ICTP, Trieste, Italy	14-18 October, 2013
39. Invited Talk at International Conference on Materials for Advanced Technologies"(ICMAT 2013) on the paper entitled "Nanomaterials for sensing and EMI applications" between 30 <sup>th</sup> June to 5 <sup>th</sup> July, 2013, Singapore	30 <sup>th</sup> June to 5 <sup>th</sup> July, 2013
38. Invited Talk at MILIT on "Nanotechnology in Defence: typically for Military Avionics" in their special workshop on Military Avionics conducted for AirForce Officers between 11-15 <sup>th</sup> March, 2013	14 <sup>th</sup> March, 2013
37. Presentation at National Institute for Interdisciplinary Science and Technology (NIIST, CSIR) for DST-NanoMission Project Review	22 <sup>nd</sup> February, 2013
36. Presentation at Vellore Institute of technology (VIT) for DST-TSD final review	14 <sup>th</sup> February, 2013
35. Presentations and Signing of MoUs with Technion Institute (Haifa), Tel Aviv Univeristy (Tel Aviv) and Elbit Systems, Advance Technology Centre(Haifa), during a delegation visit to Isreal.	18 <sup>th</sup> – 20 <sup>th</sup> Nov. 2012.
34. Presentation on "DIAT initiatives on development of Sensors" at DRDO Hqrs, in a "Workshop on Nanotechnology" at New Delhi	October 01, 2012
33. Invited Talk at "National Symposium on Nanobiotechnologies" entitled "Bio-Functional Inorganic Nanomaterials and Nanocomposites for Therapeutics and Diagnostics" organized by IIT-Mandi.	June 1-2, 2012



32. Arranged "International Conference of Functional Materials for Defence (ICFMD-2012)" as a Co-Convener, along with Naval PostGraduate School (NPS), USA and Office of Naval Research (ONR-G), USA	May 18-20, 2012
31. Invited Talk at "Indo-Japan Symposium on Zinc Oxide" entitled "Zinc oxide nanomaterials: for glucose sensing, amylase inhibition and sensing devices" " organized by IIT-Madras.	January 09-10, 2012
30. Invited Talk at 2nd International Conference on Advanced Nanomaterials and Nanotechnology (ICANN -2011)" entitled "Functional nanomaterials in sensors and biomedicine", IIT-Guwahati	December 08-10, 2011
29. Invited Talk at DAE-BRNS 6 <sup>th</sup> National Symposium on Pulsed Laser Deposition of Thin Films and Nanostructured Materials. at IISc, Bangalore on title entitled "Low and high power laser-assisted synthesis, assembly and annealing of nanomaterials and study of their property regimes"	November 09-11, 2011
28. Invited Talk at International Conference on NanoBioMed-2011 at Trieste, Italy	October 10-14, 2011
27. Invited Talk at National conference held at National Defence Academy, Pune, entitled "Synthesis and Applications of Functional Materials" (SAFM 2011)	September 23, 2011
26. Invited Talk at International Conference to celebrate the Golden Jubilee of EMSI (EM50)entitled "IMAGING STUDIES ON METAL OXIDE NANOMATERIALS FOR SENSORS AND BIOMEDICINE", HYDERABAD	July 6-8, 2011
25. Presentation on "Structural, Transport, Magnetic and Morphological Property Variations of Complex Manganite (La <sub>0.7</sub> Ba <sub>0.3</sub> MnO <sub>3</sub> ) Nanosystems Using Citrate Chelating Process" at ICMAT 2011 conference at Singapore	28 June – 2 July, 2011
24. Presentation on "Sustained Release Studies of Curcumin from Mesoporous Silica: Promising Antimicrobial Medicinal Patches" at ICMAT 2011 conference at Singapore	28 June – 2 July, 2011
23. Invited Talk at Second World Conference on Nanomedicine and Drug Delivery (WCN 2011) entitled "Nanotechnology for Biomedicine and Healthcare" in Kottayam, Kerala, India	March 11-13, 2011
22. Invited Talk at Silver Jubilee celebrations of Fergusson College (CS Department)on "Smart Materials for Defence Applications".	March 07, 2011
21. Invited talk at CFEES (Centre for Fire Explosive and Environmental safety)-DRDO, New Delhi on "Metal and Metal oxide nanomaterials for defence applications"	February 18, 2011
20. Talk/Preentation to delegation of Naval Postgraduate school (NPS, U.S.A.) on Functional Nanomaterials.	February 07, 2011
19. Invited Talk on "Metal oxide nanomaterials in sensors and biomedicine"at University of Trieste, Department of Materials (Nanomaterials and Nanotechnology division), Italy	November 23, 2010
18. Talk entitled "Functional nanomaterials for healthcare applications" at ICTP, Seminars of Physics of the Living State (Applied Physics Scientific Section) Trieste, Italy	November 19, 2010
17. Invited talk entitled "Novel synthesis routes to magnetic nanoparticles for applications in biomedicine" at International Conference on Nanotechnology and Medical Sciences" (ICNAMS-2010), Kolhapur, India	October 22, 2010
16. Talk at CEP course on "Protective Clothing" by DEBEL (DRDO), Bangalore.	September 20-24, 2010
15. Talk entitled "Cobalt nanoparticles doped emeraldine salt of polyaniline as a room temperature magnetic semiconductor" at the International Workshop and Symposium on the Synthesis and Characterisation of Glass/Glass-Ceramics (IWSSCGGC-2010), Pune, India	7-10 July 2010
14. Invited talk at Banaras Hindu Univeristy (BHU, India) on "Nanomaterials in Therapeutics"	April 6, 2010
13. Invited talk at the International Conference on Recent trends in Nano and Bio-science Hyderabad, India.	Feb.24-26, 2010
12. Invited talk at the DAE-BRNS conference on PLD 2009 at IIT-Madras, India	December 2-4, 2009
11. Invited talk at Conference on "Advanced diagnostics and drug-delivery at the nanoscale, Trieste, Italy	October 13-15, 2009
10. Talk at International Workshop on Nanotechnology and Advanced Functional Materials, National Chemical Laboratory, Pune, India	July 9-11, 2009

9. Invited Talk at "Training Course on Molecular Design and Computer-Assisted Combinatorial Chemistry" (8 to 12 June), organized by ICS-UNIDO and in cooperation with SISSA, at SISSA, Trieste, Italy.	June 08-12, 2009
8. Talk at University of Rouen, Université de Rouen Cedex-FRANCE	May 29, 2009
7. Talk at ICTP, Seminars of Physics of the Living State (Applied Physics Scientific Section) Trieste, Italy.	June 03, 2009
6. Plenary Session Talk at "Symposium on Nanomaterials and their Applications" (SNMA2009) at FCP, Pune.	March 4-6, 2009
5. Visited Indian Academy of Sciences Annual meeting, New Delhi, India for release of book "Lilavati's Daughters".	October 31 – November 2, 2008
4. Visiting Scientist as a Regular Associate of International Centre for Theoretical Physics, Trieste, Italy	May 1 – June 12, 2008
3. Invited Talk at Materials Research Society-Singapore (MRS-S) 2008, Singapore	February 25-27, 2008
14. Invited talk at PLD 2007 Conference, Rajkot, India	October 3-5, 2007
2. Presentations at International Conference on Materials for Advanced Technologies (ICMAT-2007), Singapore	June 30 – July 6, 2007
1. Plenary session talk at International Nanobioscience Conference (INBC-2006), Pune, India	6-8th August, 2006

### Patents

#### A process of synthesizing curcumin-silver nanoparticle conjugates and antimicrobial formulation

- CBR Number : 11926 dated 01/07.2016 (provisional filing)
- ANANYA Formulation

### Awards/Scholastic Achievements

- ✓ Winner of **INSA Teachers Award for 2016, in the subject Physics**. Indian National Science Academy gives awards (one per discipline, per year) to Professors and Scientists who have contributed significantly in the domain of teaching and research.
- ✓ Winner of **MRSI medal** in 2014. This is given by Materials Research Society of India, Indian Institute of Science, Bangalore, India
- ✓ Winner of **Science Oration Award** conferred to her on 28<sup>th</sup> February 2014 by DRDO HQrs, New Delhi.

### Government Funded Projects

Sr. No.	Project Title	Funding Agency	My Designation	Duration
1	Synthesis of bulk and thin films of diluted magnetic semiconductors and investigation of their electrical, optical and magnetic properties for various sensing applications	University of Pune-Indian Space Research Organization (UoP-ISRO) ~ 4 Lakhs	Principal Investigator  Co-PI: Dr. R.S. Joshee	1 Year (March 2004-April 2005) Completed
2.	Synthesis and Characterization of Bulk Ferromagnetic	University Grants Commission (UGC)	Principal Investigator	3 Years (2004-2007) Completed

	Semiconductor Oxide Materials	~ 50,000.00	Co-PI: Dr. R.S. Joshee	
3.	Synthesis and property study of semiconducting oxides with magnetic nanocluster inclusions, for their possible applications in various sensing devices.	University of Pune-Indian Space Research Organization <i>UoP-ISRO</i>  ~ 5 Lakhs	Principal Investigator  Co-PI: Dr. R.S. Joshee	2 Years (2005-07) Completed
4.	Synthesis and testing of manganite-semiconductor based microdevices	Department of Science and Technology (DST) ~ 25 Lakhs	Principal Investigator	3 Years (2007-10) To be completed in Jan 2011
5.	Synthesis and study of surfactant coated manganite nanoparticles for various biomedical applications	University of Pune Grant  ~ 3 Lakhs	Co-Investigator  PI: Dr. R.S. Joshee	2 Years (2007-09) Completed
6.	To synthesize self-assembled oriented nanomagnetic particles in thin film form and study its property regime	UGC-DAE Consortium for Scientific Research- CRS proposal  ~ 7 Lakhs	Principal Investigator  CoPI: Dr. R.J. Choudhary	4 Years (for 2007-11) Completed
7.	Metal oxide-Polymer nanocomposites for detection of gas pollutants in Sugar industries	Department of Science and Technology (DST)  ~ 19 Lakhs	Principal Investigator  CoPI: Dr. N.M. Kulkarni	1.5 Years (2009-11) Completed
8.	Cross-linked polymeric cages for encapsulation and sustained release of nanomaterials /drugs	Department of Science and Technology (DST) – NanoMission  ~ 35 Lakhs	Principal Investigator	Completed (2010-13)
9.	Synthesis and study of monodispersed and anisotropy-tuned manganite nanoparticles : application to sensors and devices	Indian Nanoelectronics Programme – IIT-Bombay (INUP – IITB)  ~ 2 Lakhs	Principal Investigator	Completed (August 2011 – July 2013)
10.	<b>DIAT-DRDO Programme on Nanomaterials:</b>  <b>Nanomaterials for Defence Applications: Coatings, Devices and Healthcare.</b>	<b>ER-IPER, DRDO Nano-Science and Technology Initiatives, DRDO, New Delhi</b>  <b>~43 Crores</b>	<b>Principal Investigator along with 8 faculty colleagues from DIAT</b>	Completed in March 2018
11.	Fabrication of Metamaterial gold/silver structures from GHz	INUP Users project from IIT-Bombay	Principal Investigator	Completed

	to PHz domain for biosensing applications			
13.	Sustained Drug releasing hydrogel nanoparticles for bacterial eye infection	DIAT in-house project 15 Lakhs	Principal Investigator	Completed in March 2018
14.	Multi-functional magnetic nanoparticles for cancer theranostic applications	Department of Science and Technology (DST) – NanoMission ~ 50 Lakhs	Co-PI Along with Dr. Dipak Maity Department of Mechanical Engineering Shiv Nadar University - PI	Completed in 2019
15.	Development of SOx/NOx derivatives using gas sensors using nanomaterials-functionalised ring resonators	Board of Research in Nuclear Science (BRNS) 28 Lakhs	Principal Investigator, along with Dr. Shaibal Banerjee and Dr. K. Girija (BARC)	Ongoing (March 2018 to 2021)
16	Design and fabrication of wide-band rejection shields using multilayers of periodic resonator arrays and carbon-based nanocomposites	Department of Science and Technology (DST) – NanoMission – Nanotechnology Board 32 Lakhs	Principal Investigator, along with Dr. Bazil Raj as Co-PI	Ongoing (November 2019 to March 2022)

#### Any Other

- **Blogger:** Blog: <https://sangeetakale.wordpress.com/>
- **President : Sharada Shakti** – National Platform for Women in S &T (Honorary position)
- Started a Company at DIAT-IIC, “**Navyukti Innovations Pvt. Ltd.**” Developed product “**Silvo-Kavach**” as universal disinfectant, under NIPL.
- Developed product **ANANYA**: A universal coating material to combat microbial infection, indigenously at DIAT. This was supported by DIAT grant for COVID19 related projects. ToT was transferred to Kinetic Green, Venus Safety and JVD Mettle Innovations Pvt. Ltd.

**Scopus ID:** 35460711400

**Google Scholar Link:** <https://scholar.google.com/citations?hl=en&user=BMoKpTQAAAAJ>