



Faculty Achievements

1. Dr.C. Kavitha's one of the reputed international research publications is recognized by Department of Science and Technology website from April 23 to still available at whats new>S&T articles.

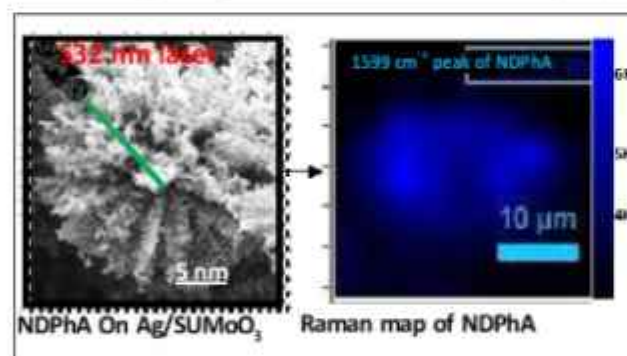
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New low-cost substrates can enhance sensitivity of analytical tools for detecting toxic pollutants

Scientists have developed a new low-cost substrate that can increase the sensitivity of Surface-enhanced Raman spectroscopy (SERS) – a vital analytical and sensing tool for detecting molecules. It can aid rapid detection of toxic pollutants present in water, food, etc.

Surface-enhanced Raman spectroscopy (SERS) has emerged as a vital analytical and sensing tool for detecting molecules. When molecules near the noble metal nanoparticles of gold, silver, platinum, etc., their Raman signals will substantially increase, which can help detect trace amounts of analyte molecules. However, as noble metals are expensive, have poor uniformity, and cannot be reused, there is a quest for alternative SERS active substrates involving non-noble metals. In this regard, semiconductor oxides have emerged as promising materials for the fabrication of SERS substrates.

Scientists from the Centre for Nano and Soft Matter Sciences (CeNS), an autonomous institute of the Department of Science & Technology (DST), Govt. of India, have designed an efficient SERS substrate based on unique sea urchin morphology of niobium pentoxide for the rapid detection of industrial pollutants. In a series of research works published in the Journals *Nanoscale Advances*, *Materials Today Communications*, and *Nanotechnology*, Dr. Ramya Prabhu B, Dr. K. Brahmavari, Kaushalendra Singh, Meenakshi Varier, and Dr. Neena S John have shown the utility of MoO₃ sea urchins for the detection of dye pollutants. Sea urchin structures possess multitude of one-dimensional (1D) spikes that can provide high surface area for analyte adsorption and hotspots for enhancing Raman signals. They prepared the sensitive SERS substrate using a simple technique involving chemical bath deposition where in MoO₃ sea urchins are directly grown on glass substrates from a solution of ammonium heptamolybdate and nitric acid at 90 °C.



Subsequently, they demonstrated that when a small amount of silver is added, the sensitivity can be enhanced further. This can help detect nitrosamine class pollutants such as N-nitroso diphenylamine (NDPhA). Silver nanoparticles are deposited on sea urchins by thermal evaporation or by photoreduction of silver nitrate. Their findings were supported by simulated vibrational spectra (part of a molecular spectrum in which the bands arise from quantized changes in the energy of mutual atomic vibrations within the molecule) of NDPhA in collaboration with Dr. C. Kavitha from BMS Institute of Technology & Management Bengaluru. "NDPhA is a potent carcinogen and a severe threat to mankind. Detection of NDPhA requires expensive and sophisticated analytical instruments. However, using the developed SERS substrates, rapid detection of NDPhA is possible," explained Dr. Ramya Prabhu B, the lead researcher.

The researchers found that MoO₃ sea urchins are rich in surface defects and oxygen vacancies, and their tapered tips have abundant surface hydroxyl groups that favor the binding of more analyte molecules. The deposition of Ag nanoparticles on the spikes of sea urchin structures further enhances its SERS properties resulting in a substrate with enhanced sensitivity. The substrate is promising for the trace detection of other toxic dyes and chemicals.

Publication links:

<https://doi.org/10.1039/C9NA60115H>

<https://doi.org/10.1016/j.mscam.2022.104995>

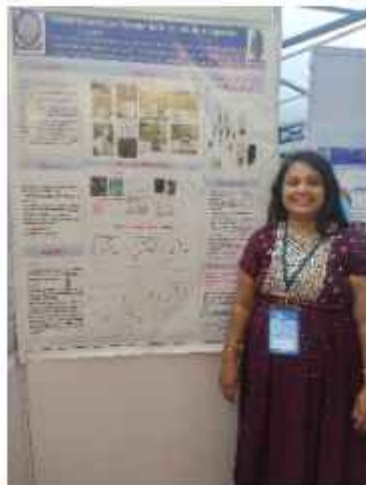
<https://doi.org/10.1088/1361-6528/abcedb>

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2. Dr. C. Kavitha Presented poster on ultracapacitor research at ECSI-IISc international conference on women in electrochemistry 7-8 April 2023.



3. Dr. C. Kavitha conducted VTU-Pre-Ph.D viva voce and open seminar 1 for her interdisciplinary chemistry student on 18th March 2022 and Dr. Dhananjaya also conducted final viva voce exam for his two of his part-time VTU-students.





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4.

Dr. C. Kavitha attended virtual Bangalore-India Nano-22 conference on 7-8 March 2022 along with student and presented a virtual interactive Poster.



5. Dr. C. Kavitha Received **outstanding women scientist award** in Materials Science at VIWA-2022, International Women Conference at Green Park, Chennai on 5th March 2022.



6. Dr. C. Kavitha received **VGST-K-FIST-L2** sponsored project worth Rs. 20 Lacs by VGST-GOK for the year 2022-2024 and it was announced on august 2021.

7. Dr. Basavaraju R.B. Received **VGST-K-FIST-L1** sponsored project worth Rs. 15 Lacs by VGST-GOK for the year 2022.

8. Dr. C. Kavitha invited to attend Bangalore –Tech Summit inaugural function which was held on 17th Nov 2021.



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9. All faculties of Physics department were acting as BOS member to design curriculum for autonomous engineering physics and lab syllabus on 12 Oct 2021.



10. Dr. Basavaraju was one of the top 2% scientist survey carried by standford university.

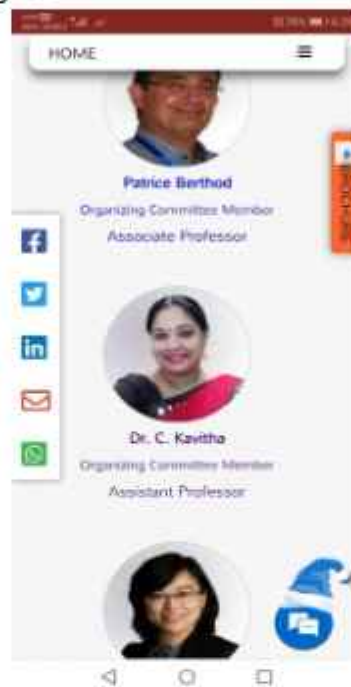
11. Dr. C. Kavitha developed Covid 19 innovative product called " UV-C light based Dry sterilizer and Sanitizer to disinfect all type of Viruses and Bacteria for non-wettable items like currencies, groceries, electronic gadgets, bags, watches, N-95 masks etc. Sept 2020





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12. Dr. C. Kavitha is invited by University of Lorraine, Vandoeuvre-Lès-Nancy, France to act as Editorial Board Member of the Journal of Material Science and Technology Research Aug(2020).
13. Dr. C. Kavitha is invited as organizing committee member and editorial member for the journal of international conference on material science exhibition and engineering will be conducted at Seol, South Korea. June 2020.



14. Dr. C. Kavitha, Dr.Dhananjay, Dr.Daruka Prasad have been invited to act as a Co-Session Chair for international conference on Accelerating Innovations in Material Sciences (AIMS-2020) organized by chemistry department.
15. Dr. C. Kavitha, Presented a paper on " A review on reduced graphene oxide hybrid nano composites for prominent applications" for international conference on Accelerating Innovations in Material Sciences (AIMS-2020) organized by chemistry department.
4. Dr.Dhananjaya, Dr. C. Kavitha, Dr.Lokesh, Dr.Daruka Prasad, Dr.Basavaraju, Mrs.Yashaswinin have been acted as resource Person for Open Course and FDP organized by our department (2020)
5. Dr. Daruka Prasad B, has extended his support as a resource person for the webinar on "powder X-ray Diffraction- A powerful tool for the characterization of nanomaterials at SaiVidya Institute of Technology, Bangalore (2020).
6. Dr. Dhananjaya. N constantly reviewing RSC, Elsevier, Springer journals (2020) 6. Dr.Daruka Prasad, Dr.Basavaraju are constantly reviewing Elsevier reputed journals (2020).



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7. We are happy to share that our FDP inauguration program and the information about the FDP (2020) was appeared at Jammu and Kashmir News links. The link is as below: <http://www.jammulinksnews.com/mb/newsdet.aspx?q=228315>

8. Dr. C. Kavitha is invited to attend 11th Bangalore India Nano 2020 curtain raiser event and international conferences 2-4 March, 2020.



9. Dr. Dhananjaya along with first year engineering students are invited to attend Nano Jatra event conducted by CeNS, Bangalore, 28th Feb 2020



9. Dr. C. Kavitha acted as a resource person for 4 days staff development program on Material Testing and measurement techniques organized by Mech dept, BMSIT&M, Bangalore Jan 2020



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10. Dr. C. Kavitha is invited to attend Industry-academic interaction Organized by NMR centre, IISc and JEOL scientific company, Japan. Thanks to eminent NMR Prof. Surya Prakash for inviting us to attend this wonderful workshop. Dec-2019.



11. One of Dr. C. Kavitha's first author Materials Today research articles have been cited by very high impact factor **Nature: Scientific Reports.2019.**

