

Professor Ashutosh Sharma
Secretary to the Government of India,
Department of Science and Technology

Ashutosh Sharma is the Secretary, Department of Science and Technology, Government of India since January 2015. He has been a professor (1997-), an Institute Chair Professor (2007-) and the Head (2003-05) of Chemical Engineering, and the founding Coordinator of Nanosciences Center and Advanced Imaging Center at the Indian Institute of Technology at Kanpur. Ashutosh received his PhD from the State University of New York at Buffalo ([SUNYAB](#); 1988) working with Prof. Eli Ruckenstein—a recipient of the US Medal of Science, his MS from the Pennsylvania State University (1984) and B.Tech. from IIT Kanpur (1982).

Ashutosh has had a broad international experience as a research faculty at SUNY Buffalo School of Medicine (1988-90), visiting faculty at University of Texas at Austin, University of Western Ontario, University of Erlangen-Nuremberg and the World Class University Program of South Korea and as a Member of the European Research Commission.

[Ashutosh's research contributions](#) are highly interdisciplinary, spanning a wide range in nanotechnology; thin polymer films; nanocomposites and devices in energy, health and environment; functional interfaces; micro/nano-mechanics of soft matter; nano-patterning and nanofabrication; colloid and interfacial engineering; biomaterials & biosurfaces; wetting and adhesion. He has published over [300 peer reviewed papers](#), filed over 15 patents, given over 100 invited or key note conference presentations and mentored a nanotechnology startup.

Ashutosh is a recipient of numerous honors and awards including the inaugural [Infosys Prize](#) in Engineering and Computer Science, [TWAS Science Prize](#) of the World Academy of Sciences, Bessel Research Award of the Humboldt Foundation, J. C. Bose Fellowship, [Bhatnagar Prize](#), Homi J. Bhabha Award of UGC, The Syed Husain Zaheer Medal of INSA, Distinguished Alumni Awards of IIT Kanpur and SUNY Buffalo, and the Life-time Achievement Award of the Indian Science Congress.

Ashutosh is an elected Fellow of The [Indian National Science Academy](#), [The Indian Academy of Sciences](#), [The National Academy of Sciences, India](#) and [Indian National Academy of Engineering](#), The World Academy of Sciences ([TWAS](#)) and the Asia-Pacific Academy of Materials. He has also served on the Councils of the first two. He has been an associate editor of [ACS Applied Materials and Interfaces](#), [Proceedings of Indian National Science Academy](#) and [ASME Journal of Micro- and Nano-Manufacturing](#) and has been on the editorial boards of several journals: *Carbon*; *ACS Industrial and Engineering Chemistry Research*; *Current Science*; *Nanomaterials and Energy*; *Chemical Engineering Science*; *Journal of Colloid and Interface Science*; *Canadian Journal of Chemical Engineering* and *Indian Chemical Engineer*.

Ashutosh's other interests are in ancient history and philosophy, poetry and [art](#).

Ashutosh Sharma

Department of Science and Technology, Government of India
(on deputation from) Department of Chemical Engineering
Indian Institute of Technology at Kanpur

PROFESSIONAL EXPERIENCE

Secretary (January 2015-), Department of Science and Technology, Government of India.

Institute Chair Professor (2007-); **C V Seshadri Chair Professor** (2012-); **INAE Chair Professor** (2011-2013); **Ranjit Singh Chair Professor** (2008-2011); **Professor** (1997); **Associate Professor** (1994-97); **Assistant Professor** (1990-1994), Department of Chemical Engineering, Indian Institute of Technology Kanpur.

Coordinator & PI, DST Center on Nanosciences, Indian Institute of Technology Kanpur (2005-)

Head, Department of Chemical Engineering, Indian Institute of Technology, Kanpur (2003-05).

Research Scientist, Department of Ophthalmology, School of Medicine and Biomedical Sciences, State University of New York at Buffalo (1987- 1990).

Visiting Appointments: University of Texas at Austin, 1997 (one semester); University of Western Ontario, 2005 (summer term); University of Erlangen-Nuremberg, 2006-07 (six months); WCU Adjunct Professor, World Class University Program of South Korea at Yeungnam University, 2009-2013.

EDUCATION

Ph.D., Chemical Engineering, State University of New York at Buffalo, 1987.
Graduated summa cum laude.

Advisor: Eli Ruckenstein (a recipient of the US Medal of Science)

M.S., Chemical Engineering, The Pennsylvania State University, 1984.
Graduated summa cum laude.

B.Tech., Chemical Engineering, Indian Institute of Technology at Kanpur, 1982.
Graduated with distinction.

AREAS OF CURRENT RESEARCH

- Soft nanofabrication: self-organization, bottom-up, top-down and electrospinning
 - Soft interfaces: Wetting, adhesion and friction
 - Mechanics, patterns and instabilities of soft visco-elastic interfaces and ultrathin films
 - Multiscale patterning of polymers, carbon, ceramics and hydrogels
 - Functional and nano-materials: adhesive, catalytic, optical, super-wetting and nano-composites
 - Biomaterials, biosurfaces and Cells on surfaces
 - Multiscale MEMS/NEMS & Microfluidic Systems: materials and platforms
 - Carbon micro/nanostructures and composites in environment, health and energy
 - Interfacial and colloidal interactions
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Peer Reviewed Publications (until 2016)

1. K. Mondal, R. Kumar and A. Sharma, Metal-oxide decorated multilayered 3D porous carbon thin films for supercapacitor electrodes, *ACS Industrial & Engineering Chemistry Research* (2016).
2. G. Mishra, N. Mittal and A. Sharma, Multifunctional mesoporous carbon capsules and their robust coatings for encapsulation of actives: antimicrobial and anti-bioadhesion functions, *ACS Applied Materials & Interfaces* (2016).
3. Shilpa, S. Katiyar, K. Nallathamby and A. Sharma, Facile Synthesis of hierarchical porous carbon monolith: a free-standing anode for Li-ion battery with enhanced electrochemical performance, *ACS Industrial & Engineering Chemistry Research* **55**, 11818–11828 (2016).
4. K. Mondal and A. Sharma, Recent advances in electrospun metal-oxide nanofiber based interfaces for electrochemical biosensing (Review), *RSC Advances* (2016).
5. R. Kumar, P. Rai and A. Sharma, Free-standing NiV₂S₄ nanosheet arrays on 3D Ni framework via anion exchange reaction as a novel electrode for asymmetric supercapacitor applications, *J. Materials Chemistry A* (2016).
6. K. Mondal and A. Sharma, Recent advances in synthesis and application of photocatalytic metal-metal oxide core-shell nanoparticles for environmental remediation and their recycling process (Review), *RSC Advances* **6**, 83589 - 83612 (2016).
7. S. Patil, A. Ranjan, T. Maitra and A. Sharma, [One-Step Fabrication of Microchannels Lined with a Metal Oxide Coating](#), *ACS Applied Materials & Interfaces*, **8**, 10494–10498 (2016).
8. R. Kumar, T Bhuvana and A. Sharma, Polyaniline wrapped aminated graphene composite on nickel foam as three-dimensional electrodes for enzymatic microfuel cell, *RSC Advances* (2016).
9. M. A. Ali, K. Mondal, Y. Jiao, S. Oren, Z. Xu, A. Sharma, and L. Dong, Microfluidic immuno-biochip for detection of breast cancer biomarkers using hierarchical composite of porous graphene and titanium dioxide nanofibers, *ACS Applied Materials & Interfaces* (2016).
10. P. Sachan, N. Saurakhiya, R. Kumar, A. Sharma, Micropatterned arrays of functional materials by self-organized dewetting of ultrathin polymer films combined with electrodeposition, *RSC Advances* (2016).
11. Shilpa, S. K. Das, M. A. F. Afzal, S. Srivastava, S. Patil and A. Sharma, Enhanced electrical conductivity of suspended carbon nanofibers: effect of hollow structure and improved graphitization, *Carbon* **108**, 135-145 (2016).
12. Shilpa and A. Sharma, Free standing hollow carbon nanofibers mats for supercapacitor electrodes, *RSC Advances* **6**, 78528 - 78537 (2016).
13. N. Singh, M. A. Ali, K. Suresh, V. V. Agrawal, P. Rai, A. Sharma, B. D. Malhotra and R. John, In-situ electrosynthesized nanostructured Mn₃O₄-polyaniline nanofibers-

- biointerface for endocrine disrupting chemical detection, *Sensors & Actuators: B. Chemical* **236**, 781-793 (2016).
14. R. Kumar, P. Rai and A. Sharma, 3D urchin-shaped Ni₃(VO₄)₂ hollow nanospheres for high-performance asymmetric supercapacitor applications, *Journal of Materials Chemistry A*, **4**, 9822-9831 (2016). DOI: 10.1039/C6TA03519A
 15. A. Ghosh, D. Bandyopadhyay and A. Sharma, Influence of the mutable kinetic parameters on the adhesion and debonding of thin viscoelastic films, *J. Colloid Interface Science* **477**, 109–122 (2016).
 16. S. Kumar, P. Rai, J. G. Sharma, A. Sharma and B. D. Malhotra, PEDOT:PSS/PVA nanofibers decorated conducting paper for cancer diagnostics, *Advanced Materials Technologies* (2016). DOI: 10.1002/admt.201600056
 17. N. Singh, K. Mondal, M. Misra, A. Sharma and R. K. Gupta, Quantum dot sensitized electrospun mesoporous titanium dioxide hollow nanofibers for photocatalytic applications, *RSC Advances* **6**, 48109-48119 (2016).
 18. M. A. Ali, C. Singh, K. Mondal, S. Srivastava, A. Sharma and B. D. Malhotra, Mesoporous few-layer graphene platform for affinity biosensing application, *ACS Applied Materials & Interfaces*, **8**, 7646–7656 (2016).
 19. N. Mittal, R. Kumar, G. Mishra, D. Deva and A. Sharma, Mesoporous carbon nanocapsules based coatings with multifunctionalities, *Advanced Materials Interfaces*, **3** (2016). DOI: 10.1002/admi.201500708
 20. K. Mondal, M. A. Azahar, S. Srivastava, B. D. Malhotra and A. Sharma, Electrospun functional micro/nanochannels embedded in porous carbon electrodes for microfluidic biosensing, *Sensors & Actuators: B. Chemical* **229**, 82-91 (2016).
 21. R. Kumar, A. Agrawal, R. Nagarale and A. Sharma, High performance supercapacitors from novel metal doped ceria decorated aminated graphene, *J. Physical Chemistry C* **120**, 3107–3116 (2016).
 22. R. Kumar, P. Rai and A. Sharma, Facile synthesis of Cu₂O microstructures and their morphology dependent electrochemical supercapacitor properties, *RSC Advances* **6**, 3815-3822 (2016).
 23. S. Katiyar, K. Mondal and A. Sharma, One-step sol-gel synthesis of hierarchically porous, flow-through carbon/silica monoliths, *RSC Advances* **6**, 12298 - 12310 (2016).
 24. R. Kumar, S. S. Gupta, S. Katiyar, V. K. Raman, S. K. Varigala, T. Pradeep and A. Sharma, Carbon aerogels through organo-inorganic co-assembly and their application in water desalination by capacitive deionization, *Carbon* **99**, 375-383 (2016).
 25. A. Rammohan, G. Mishra, B. Mahaling, L. Tayal, A. Mukhopadhyay, S. Gambhir, A. Sharma and S. Sivakumar, PEGylated carbon nanocapsule: a universal reactor and carrier for *in vivo* delivery of hydrophobic and hydrophilic nanoparticles, *ACS Applied Materials & Interfaces* **8**, 350-362 (2016).

26. A. K. Srivastava, S. N. Kartik, B. Bhartia, K. Mukhopadhyay and A. Sharma, Long term biopotential recording by body conformable photolithography fabricated low cost polymeric microneedle arrays, *Sensors & Actuators: A. Physical* **236**, 164-172 (2015).
27. R. Kumar, K. Jahan, R. K. Nagarale and A. Sharma, Electroosmotic flow in a cell built with electrodes having two redox couples, *ACS Industrial & Engineering Chemistry Research*, **54**, 10183–10189 (2015).
28. P. Sachan, M. Kulkarni and A. Sharma, Hierarchical micro/nano structures by combined self-organized dewetting and photopatterning of photoresist thin films, *Langmuir* **31**, 12505–12511 (2015).
29. R. Mukherjee and A. Sharma, Instability, Self-Organization and pattern formation in thin soft films, *Soft Matter* **11**, 8717 - 8740 (2015).
30. A. Modi, S. Bhaway, B. D. Vogt, J. Douglas, A. Al-Enizi, A. Elzatahry, A. Sharma and A. Karim, Direct immersion annealing of thin block copolymer films, *ACS Applied Materials & Interfaces*, **7**, 21639–21645 (2015).
31. N. Mittal, D. Deva, R. Kumar and A. Sharma, Exceptionally robust and conductive superhydrophobic free standing film of mesoporous carbon nanocapsule/polymer composite for multifunctional applications, *Carbon* **93**, 492–501 (2015).
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33. M. A. Ali, K. Mondal, C. Singh, B. D. Malhotra and A. Sharma, Anti-epidermal growth factor receptor conjugated mesoporous zinc oxide nanofibers for breast cancer diagnostics, *Nanoscale* **7**, 7234-7245 (2015).
34. B. Ray, G. Biswas and A. Sharma, Regimes during liquid drop impact on a liquid pool, *J. Fluid Mechanics* **768**, 492-523 (2015).
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38. D. Kashyap, R. S. Yadav, S. Gohil, et al., Fabrication of vertically aligned copper nanotubes as a novel electrode for enzymatic biofuel cells, *Electrochimica Acta* **167**, 213–218 (2015).

39. S. Roy and A. Sharma, Self-organized morphological evolution and dewetting in solvent vapor annealing of spin coated polymer blend nanostructures, *J. Colloid Interface Science* **449**, 215-25 (2015).
40. J. Mitra and A. Sharma, Luminescent, ferromagnetic silver glyco-nanoparticles: synthesis to annealing-induced substrate specific transformation, *RSC Advances* **5**, 28901-28907 (2015).
41. B. Mordina, R. K. Tiwari, D. K. Setua and A. Sharma, Superior elastomeric nanocomposites with electrospun nanofibers and nanoparticles of CoFe_2O_4 for magnetorheological applications, *RSC Advances* **5**, 19091-19105 (2015).
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44. Shilpa, B. M. Basavaraja, S. B. Majumder and A. Sharma, Electrospun hollow glassy carbon/reduced graphene oxide nanofibers with encapsulated ZnO nanoparticles: a free standing anode for Li-ion battery, *J. Materials Chem. A* **3**, 5344 - 5351 (2015).
45. D. Kashyap, P. S. Venketeshwaran, P. Dwivedi, Y. H. Kim, G. M. Kim, A. Sharma and S. Goel, Recent developments in enzymatic biofuel cells: towards Implantable Integrated Micro-devices, *International Journal of Nanoparticles* **8**, 61-81(2015).
46. L. Xu, A. Sharma, S. W. Joo, H. Liu and T. Shi, Unusual dewetting of thin polymer films in liquid media containing a solvent and a non-solvent, *Langmuir* **30**, 14808-14816 (2014).
47. B. Mordina, R. K. Tiwari, D. K. Setua and A. Sharma, Magnetorheology of polydimethylsiloxane elastomer/ FeCo_3 nanocomposite, *J. Phys. Chem C* **118**, 25684–25703 (2014).
48. D. Kashyap, P. Dwivedi, J. Pandey, Y. H. Kim, G. M. Kim, A. Sharma, S. Goel, Application of electrochemical impedance spectroscopy in bio-fuel cell characterization: A Review, *International Journal of Hydrogen Energy*, **39**, 20159–20170 (2014).
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51. R. Gupta, R. Kumar, A. Sharma and N. Verma, Novel Cu-carbon nanofiber composites for the counter electrodes of dye sensitized solar cells, *International Journal of Energy Research (Wiley)* **39**, 668–680 (2014).

52. K. Mondal, S. Bhattacharyya and A. Sharma, Photocatalytic degradation of Naphthalene by electrospun mesoporous carbon-doped anatase TiO₂ nanofiber mats, *Industrial & Engineering Chemistry Research*, **53**, 18900–18909 (2014).
53. N. Saurakhiya, S.K. Sharma, R. Kumar and A. Sharma, Templated electro-chemical synthesis of polyaniline/ZnO coaxial nanowires with enhanced photoluminescence, *Industrial & Engineering Chemistry Research*, **53**, 18884–18890 (2014).
54. K. Awasthi, S. Choudhury, H. Komber, F. Simon, P. Formanek, A. Sharma and M. Stamm, Functionalization of track-etched poly(ethylene terephthalate) membranes as a selective filter for hydrogen purification, *International Journal of Hydrogen Energy* **39**, 9356–9365 (2014).
55. M. Dey, D. Bandyopadhyay, A. Sharma, S. Qian, S. W. Joo, Charge leakage mediated pattern miniaturization in the electric field induced instabilities of an elastic membrane, *Industrial & Engineering Chemistry Research*, **53**, 18840–18851 (2014).
56. H. Lakhotiya, K. Mondal, R. K. Nagarale and A. Sharma, Low voltage non-gassing electro-osmotic pump with zeta potential tuned aluminosilicate frits and organic dye electrodes, *RSC Advances* **4**, 28814-28821 (2014).
57. C. S. Sharma, H. Katepalli, A. Sharma, G. T. Teixidor and M. Madou, Fabrication of resorcinol-formaldehyde xerogel based high aspect ratio 3-D hierarchical C-MEMS structures, *Electrochemical Society Transactions (ECS Trans.)* **61(7)**, 45-54 (2014).
58. S. K. Sharma, N. Saurakhiya, S. Barthwal and A. Sharma, Tuning of structural, optical and magnetic properties of ultrathin and thin ZnO nanowire arrays for nano devices applications, *Nanoscale Research Letters* **9**, 122 (17 pages) (Springer) (2014).
59. K. Mondal, M. A. Ali, V. V. Agrawal, B. D. Malhotra and A. Sharma, Highly sensitive biofunctionalized mesoporous electrospun TiO₂ nanofiber based Interface for biosensing, *ACS Applied Materials & Interfaces* **6**, 2516-2527 (2014).
60. S. Singh, H. C. Joshi, A. Srivastava, A. Sharma and N. Verma, An efficient antibacterial multi-scale web of carbon fibers with asymmetrically dispersed Ag–Cu bimetal nanoparticles, [*Colloids and Surfaces A: Physicochemical and Engineering Aspects*](#), **443**, 311-319 (2014).
61. P. Khare, A. Sharma and N. Verma, Synthesis of phenolic precursor-based porous carbon beads in-situ dispersed with copper-silver bimetal nanoparticles for antibacterial applications, *J. Colloid Interface Sci.* **418**, 216–224 (2014).
62. A. K. Srivastava, P. Sachan, C. Samanta, K. Mukhopadhyay and A. Sharma, Domain growth of Carbon Nanotubes assisted by dewetting of thin catalyst precursor films, *Applied Surface Science* **288**, 215-221 (2014).
63. S. Jain, A. Sharma and B. Basu, Vertical electric field stimulated neural cell functionality on porous amorphous carbon electrodes, *Biomaterials* **34**, 9252–9263 (2013).

64. J. Mitra, S. Jain, A. Sharma and B. Basu, Patterned growth and differentiation of neural cells on polymer derived carbon structures *in vitro*, *Carbon* **65**, 140-155 (2013).
65. Y. Kumaresan, A. Rammohan, P. K. Dwivedi and A. Sharma, Large area IR microlens arrays of chalcogenide glass photoresists by grayscale maskless lithography, *ACS Applied Materials & Interfaces* **5**, 7094–7100 (2013).
66. A. R. Hood, N. Saurakhiya, D. Deva, A. Sharma and N. Verma, Development of bimetal-grown multi-scale carbon micro-nanofibers as an immobilizing matrix for enzymes in biosensor applications, *Material Science and Engineering C: Mater Biol Appl* **33**, 4313-4322 (2013).
67. S. Singh, M. Ashfaq, R. K. Singh, H. C. Joshi, A. Srivastava, A. Sharma and N. Verma, Preparation of surfactant-mediated silver and copper nanoparticles dispersed in hierarchical carbon micro-nanofibers for antibacterial applications, *New Biotechnology (Elsevier)* **30**, 656-665 (2013).
68. P. Khare, N. Talreja, D. Deva, A. Sharma and N. Verma, Carbon nanofibers containing metal-doped porous carbon beads for environmental remediation applications, *Chemical Engineering Journal* **229**, 72-81(2013).
69. B. Ray, D. Bandyopadhyay, A. Sharma, S. W. Joo, S. Qian and G. Biswas, Long-wave interfacial instabilities in a thin electrolyte film undergoing coupled electrokinetic flows: a nonlinear analysis, *Microfluidics and Nanofluidics* **15**, 19-33 (2013).
70. J. Mitra, G. Tripathi, A. Sharma and B. Basu, Scaffolds for bone tissue engineering: role of surface patterning on osteoblast response, *RSC Advances* **3**, 11073 –11094 (2013).
71. K. Mondal, J. Kumar and A. Sharma, TiO₂ nanoparticles impregnated photocatalytic macroporous carbon films by spin coating, *Nanomaterials & Energy (an ICE Journal)* **2**, 121-133 (2013).
72. J. Mitra, M. Ghosh, R. Bordia and A. Sharma, Photoluminescent electrospun submicron fibers of hybrid organosiloxane and derived silica, *RSC Advances*, **3**, 7591-7600 (2013).
73. S. Jain, T. J. Webster, A. Sharma and B. Basu, Intracellular reactive oxygen stress, cell proliferation and apoptosis of Schwann cells on carbon nanofibrous substrates, *Biomaterials* **34**, 4891-4901 (2013).
74. A. Verma and A. Sharma, Taming of self-organization in highly confined soft matter to sub-100 nm scales: nanolens-arrays by spinodal instability of thin polymer films for high-resolution optical imaging, *Current Science* **104**, 1037-1045 (2013). (**Cover page article**).
75. M. Ashfaq, S. Singh, A. Sharma and N. Verma, Cytotoxic evaluation of the hierarchical web of carbon micro-nanofibers, *Ind. & Eng. Chem. Res.* **52**, 4672-4682 (2013).
76. K. Mondal, J. Kumar and A. Sharma, Self-organized macroporous thin carbon films for supported metal catalysis, *Colloids & Surfaces A* **427**, 83-94 (2013).

77. S. K. Sharma, H. Gaur, M. Kulkarni, G. Patil, B. Bhattacharya, A. Sharma, PZT-PDMS composite for active damping of vibrations, *Composites Sci. & Tech.* (Elsevier) **77**, 42-51 (2013).
78. P. Singh, K. Mondal and A. Sharma, Reusable electrospun mesoporous ZnO nanofiber mats for photocatalytic degradation of polycyclic aromatic hydrocarbon dyes in wastewater, *J. Colloid Interface Sci.* **394**, 208–215 (2013).
79. B. Ray, G. Biswas, A. Sharma and S.W.J. Welch, CLSVOF method to study consecutive drop impact on liquid pool, *International Journal of Numerical Methods for Heat and Fluid Flow* **23**, 143-157 (2013).
80. A. Rammohan, L. Tayal, A. Kumar, S. Sivakumar and A. Sharma, Fabrication of polymer-modified monodisperse mesoporous carbon particles by template-based approach for drug delivery applications, *RSC Advances* **3**, 2008-2016 (2013).
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