

Dr. Dhiraj Kumar

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PROFESSIONAL MEMBERSHIPS

RSC – MRSC, UKSB, ESB and Young Scientist forum (Biomaterials Society).

REVIEWER

For International Journal of Nanomedicine, Journal of Nanoparticle Research, Journal of Nano Research, Scientific and Academic publishing (guest co-editor – Special issue).

RESEARCH INTEREST

- Microfluidic devices, nanostructure fabrication, bionanotechnology, nanomedicine, biomaterials, drug & gene delivery, diagnostics, biosensing.
- Nanomaterials likes metal (Au, Ag, Cu NPs, Si QD), metal oxide (TiO₂, Fe₂O₃/Fe₃O₄ NPs & Al₂O₃/TiO₂ Nanotubes), lipid and polymeric (Chitosan, ORMOSIL) nanomaterials/nanoparticles, hydrogels, carbon based Nanomaterials (CNTs, graphene).
- Synthesis, functionalization and characterization of different types of novel nanoparticles, nanomaterials and biomaterials for industrial applications.

INSTRUMENTAL TRAININGS AND WORKSHOPS

- Chemical vapor deposition, RIE, RF and DC Sputtering, Photolithography, etching, deposition & characterization, nanostructure fabrication, Spin and Dip coating, ICP-MS @ *University of Canterbury, NZ.*
- UV-Visible Spectrometer, DLS & Zeta and Nano-titrator, Atomic Absorption Spectroscopy, Ultracentrifugation, Dialysis @ *NIBEC, University of Ulster.*
- FT-IR and Raman Spectroscopy, Photoluminescence or fluorescence Spectrophotometer, XRD, XPS, Thermal Gravimetric Analysis, DSC, AFM @ *NIBEC, University of Ulster.*
- Scanning Electron Microscopy and Transmission Electron Microscopy @ *training at All India Institute of Medical Science [AIIMS], (March, 10-15, 2008).*

ACADEMIC QUALIFICATIONS

- Ph.D [Nanomaterials and Nanomedicine] (2009–2012)
NIBEC, University of Ulster, Jordanstown, Belfast, U.K.
Thesis title “*Co-Functionalised Gold Nanoparticles for Drug Delivery Applications*”.
- M.Tech. [Nanobiotechnology] (2007-2009)
Amity Institute of Nanotechnology, Amity University.
Thesis title: “*Synthesis and characterization of Nanoporous alumina membranes for drug delivery*” [CGPA 8.8 – *1st division with distinction*].
- M.Sc. Physical Chemistry (2004-2006)
Department of Chemistry, University of Delhi [*2nd division*].
- B.Sc. [Honours] Chemistry (2001-2004)
Hindu College, University of Delhi [*1st division*].

RESEARCH EXPERIENCE

- *Postdoctoral Fellow* (2013-Current)
 - A/Prof. Peter Sykes, University of Otago. [*Synthesis & characterisation of AuNPs and Lipid NPs, modification using PEG, dye and targeting peptides; for targeting ovarian cancer*]

- Dr. Maan Alkaisi, University of Canterbury. [*Synthesis & characterisation of AuNPs & Si QD, modification of surfaces using NPs; modification of bio-polymer for tissue engineering*]
- **Postdoctoral Fellow** (2012–2013)
Prof. Brian Meenan and Dr. Dorian Dixon, NIBEC, University of Ulster. [*Synthesis & characterisation of AuNPs, modification using PEG and peptides (RME & H5WGY); for targeting cancer cells & improved radiation therapy*]
- (2009–2012): *Did my PhD at NIBEC, University of Ulster.*
- **Researcher** (2009–2009)
Prof. Dusan Losic (Currently at University of Adelaide), IWRI, University of South Australia. [*Synthesis & characterisation of Alumina nanotubes, modification using drug and silanes; for sustained and controlled release of chemotherapy drug*]
- **Researcher** (2007–2009)
A/Prof. Susmita. Mitra, Amity Institute of Nanotechnology. [*Synthesis & characterisation of ORMOSIL NPs, modification using dye, poly acrylic acid; for delivery poorly soluble drugs*]
- **Researcher** (2008–2008)
Prof. Amit Kumar Dinda, All India Institute of Medical Sciences [AIIMS], India. [*Characterisation and study of toxicity of ORMOSIL NPs on THP1 & J774 mouse macrophage cells*]
- **Researcher** (2006–2007)
Prof. Rama Kant, Department of Chemistry, University of Delhi. [*Programming on Mathematica Software and interpreting the Observation on the basis of theories*]

REFERED JOURNAL ARTICLES and BOOK CHAPTERS

- *Glutathione: role in biomolecule assisted approach for targeted drug release*, D Kumar, I Mutreja, and S Mitra. (Working on Book chapter)
- *ORMOSIL Nanoparticle Interaction with Macrophage Cells: Assessment of Cell Viability on the Basis of Physico-Chemical Properties of Nanoparticles*, D Kumar, I Mutreja, C K Prashant, M Bhat, A K Dinda and S Mitra. (Submitted)
- *Current Density Enhancement in Inverted Nano-pyramid Textured Crystalline Silicon Solar Cell using Gold Nanoparticles*, S Sivasubramaniam, D Kumar, V B Golovko, and M Alkaisi, 2013. (Micro/Nano Materials, Devices, and Systems, SPIE Proceeding, DOI:10.1117/12.2033731)
- *The profile of payload release from gold nanoparticles modified with a BODIPY®/PEG mixed Monolayer*, D Kumar, I Mutreja, BJ Meenan and D Dixon, 2013. (Journal of Nano Research, DOI: 10.4028/www.scientific.net/JNanoR.25.16)
- *Titania Nanotube Porosity Controls Dissolution Rate of Sputter Deposited Calcium Phosphate (CaP) Thin Film Coatings*, I Mutreja, D Kumar, A Boyd and BJ Meenan, 2012. (RSC Advances, DOI: 10.1039/C3RA40898A)
- *Glutathione Mediated Release of BODIPY from Poly Ethylene Glycol co-functionalized Gold Nanoparticles*, D Kumar, BJ Meenan and D Dixon, 2012 (International Journal of Nanomedicine (IF-4.976), DOI: <http://dx.doi.org/10.2147/IJN.S33726>)
- *Controlling the Size and Size Distribution of Gold Nanoparticles: A Design of Experiment Study*, D Kumar, BJ Meenan, I Mutreja, R D'Sa and D Dixon, 2012. (International Journal of Nanoscience (IF-), DOI: 10.1142/S0219581X12500238)
- *Polyethylene Glycol Functionalized Gold Nanoparticles: The Influence of capping density on stability in various media*. J Manson*, D Kumar* (*Equal contribution), BJ Meenan and D Dixon, 2011. (Gold Bulletin (IF-2.719), DOI: 10.1007/s13404-011-0015-8)

- *The loading and release properties of nanoporous anodic alumina for delivery of drugs and drug carriers*, M. Sinn Aw, S. Simovic, D. Kumar, J. Addai-Mensah, D. Losic, 2010. (ICONN 2010, IEEE Xplore, DOI: 10.1109/ICONN.2010.6045213)

CONFERENCE TALKS

- *Synthesis and Surface modification of Gold Nanoparticles*, D. Kumar, BJ Meenan and D Dixon, Research Conference, University of Ulster, Jordanstown, 18th Jan 2012.
- *Gold Nanoparticles for Drug Delivery*, D. Kumar, BJ Meenan and D Dixon, NIBEC Lecture Series, University of Ulster, 1st June 2011.

CONFERENCE PROCEEDINGS

- *Toxicity assessment of Ormosil Nanoparticles*, D Kumar, CK Prashant, M Bhat, AK Dinda, S. Mitra, MAM-2012.
- *Effect of PEG on Release Profile of BODIPY FL L-Cystine Functionalised Gold nanoparticles*, D. Kumar, B J Meenan and D Dixon, UKSB, University of Nottingham, UK (27-28th June 2012).
- *Effect of Synthesis Parameters on Size and Distribution of Gold Nanoparticles*, D. Kumar, I Mutreja, J Hamilton, B J Meenan, D Dixon, European Conference on Biomaterials, ESB Dublin, Ireland (4th – 8th Sep. 2011).
- *A Protocol for Dispersion of Nanoparticles in Organic Solvents*, J. Manson, D. Kumar, D. Dixon, B. J. Meenan, European Conference on Biomaterials, ESB with Tampere University of Technology, Department of Biomedical Engineering, Finland (11th – 15th Sep. 2010).
- *Synthesis and Centrifugal Washing of PEG Capped Gold Nanoparticles and Their Stability in Various Media*, D. Kumar, D. Dixon, J. Manson, B. J. Meenan, Northern Ireland Biomedical Engineering Society/Microscopical Society of Ireland (NIBES/MSI), Joint Symposium, UUJ, Belfast, UK (25th – 27th Aug. 2010).
- *Nanoporous alumina membranes for sustained delivery of drug carriers*, M. Sinn Aw, S. Simovic, K. Dhiraj, J. Addai-Mensah, D. Losic, ARNAM/ARCNN Joint Workshop, Flinders University, (19-23 July 2010).
- *Engineering the nanostructures and chemistry of nanoporous alumina membranes for loading and release of poorly soluble drugs and drug carriers*, M. Sinn Aw, S. Simovic, K. Dhiraj, J. Addai-Mensah, D. Losic, The 27th Australian Colloid and Surface Science Student Conference, 1-5 February 2010, Adelaide.
- *Toxicity Assessment of Pristine and Amine Functionalized Organically Modified Silane Nanoparticles*, D. Kumar, P. Kumar, A. K. Dinda, S. Mitra, Ansal Institute of Technology, Gurgaon (Oct. 2009).
- *Synthesis of Hydrophobic Dye-doped variable core-shell nanoparticles using organosilane precursors*. D. Kumar, P. Kumar, A. K. Dinda and S. Mitra, NanoToday, Singapore, (Aug. 2009).
- *Effect of Fractal Roughness on the Potentiostatic Current Transients and Linear Sweep Voltammograms*, S. K. Jha, D. Kumar and R. Kant, International Symposium on Advances in Electrochemistry Science and Technology (ISAEST-8) Goa, India, (Nov. 28-30, 2006).
- *Theory of Capacitive Behavior of Nanostructured Electrode/Electrolyte Interfaces*, D. Kumar and R. Kant, National Seminar on Multifunctional Nanomaterials Nanostructures and Applications, Delhi, (Dec. 22-23, 2006).

MODULES TAUGHT

- CHEM111 @ University of Canterbury, NZ (Tutorial)
- MEC004, MEC101 – MS Excel & project management @ University of Ulster (Tutorial)
- MEC103 [Material and properties, Atomic Structure, Crystal Structure, Electromagnetism] @ University of Ulster (Tutorial)

- BME303 [Spectroscopy – UV-Vis, Dynamic light scattering (DLS) & Zeta potential, Nano-titrator, FT-IR, Raman, XRD, XPS] @ University of Ulster (Tutorial)
- MEC318/324 and EEE154 – Electrical and Electronics @ University of Ulster (Tutorial)

STUDENT SUPERVISION

- Nanoparticles and Quantum dots to improve Si based solar cell efficiency @ *University of Canterbury, NZ (PhD)*.
- Synthesis and Characterization of PEG, RME peptide and PEG/RME co-functionalised gold nanoparticles @ *University of Ulster, UK (PG)*.
- Effect of Temperature & Stirring rate on Size & Size Distribution of Gold Nanoparticles @ *University of Ulster, UK (UG)*.
- Effect of PEG Concentrations on the loading capacity of Gold Nanoparticles for BODIPY as a model drug @ *University of Ulster, UK (PG)*.
- Effect of PEG concentration on aggregation and distribution of gold nanoparticles in PLGA thin films @ *University of Ulster, UK (UG)*.

REFEREES

- Prof. Maan Alkaisi, (**Postdoctoral Supervisor (Visiting Fellow)**)
MacDiarmid Institute, University of Canterbury,
Christchurch, New Zealand, 8140.
Email: maan.alkaisi@canterbury.ac.nz
- Prof. Brian Meenan, (**Ph.D and Postdoctoral Supervisor**)
NIBEC, University of Ulster,
Jordanstown Campus, Belfast, BT37 0QB.
Email: bj.meenan@ulster.ac.uk
- Dr. Susmita Mitra, Associate Prof. (**Mentor and Previous Employer**)
Amity Institute of Nanotechnology (AINT), Amity University,
Sector 125, Noida, U.P, INDIA.
Email: susm58@yahoo.com
- Dr. Dorian Dixon, (**Ph.D and Postdoctoral Supervisor**)
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