- **March 2005:** ***Amino Acid Detector for MARS Mission***

  A microfabricated capillary electrophoresis instrument for sensitive amino acid biomarker analysis is developed. This has been tested for working in environments similar to that prevailing in Mars and afforded ppb levels of detection.

  "Development and Evaluation of a Microdevice for Amino Acid Biomarker Detection and Analysis on Mars", Skelley, A.M., J.R. Scherer, A.D. Aubrey, W.H. Grover, R.H.C. Ivester, P. Ehrenfreund, F.J. Grunthaner, J.L. Bada and R.A. Mathies, *PNAS*, **102** (2005), p. 1041.

- **March 2005:** ***Ultrasensitive Detection of Anthrax Biomarker***

  SERS has been applied for detecting anthrax biomarker up to 10^3 spores, which is less than the critical limit of 10^4 spores. This technique has been successfully transitioned to a field-portable instrument for widespread in anthrax detection.

  "Rapid Detection of an Anthrax Biomarker by Surface-Enhanced Raman Spectroscopy", Zhang, X.Y., M.A. Yong, O. Lyandres and R.P. van, Duyne, *J. Am. Chem. Soc.*, **127** (2005), p. 4484.

- **March 2005:** ***Demystifying SERS***

  SERS presents one of the most important tool that provides vibrational information, with a limiting accuracy of a single molecule. The role of nanoparticle surface charge in bringing about SERS has been analysed in great detail. The information presented in critical for choosing and designing substrates for optimized SERS activity.

  "Role of Nanoparticle Surface Charge in Surface-Enhanced Raman Scattering", Alvarez-Pueble R.A., E. Arceo, P.J. G. Goulet, J.J. Garrido and R.F. Aroca, *J. Phys. Chem.*, **109** (2005), p. 3787.

- **March 2005:** ***Nanoparticle based Arsenic Removal from Water***

  Iron nanoparticle have been shown to extract and remove arsenic ions from water sources. The removal of highly poisonous arsenic ions from water sources presents a challenge in developing countries and this presents them with a unique method for both *in-situ* and *ex-situ* water purification.

  "Removal of Arsenic (III) from Groundwater by Nanoscale Zero-Valent Iron", Kanel, S.R., B. Manning, L. Chralet, H. Choi, *Environmental Science and Technology*, **39** (2005), p. 1291.

- **March 2005:** ***Single Walled Carbon Nanotube for Chemical Detection***

  Single walled carbon nanotubes has been used for fabricating chemicapacitors. These provide highly sensitive detection of vapours and can be used repeatedly.

  "Chemical Detection with a Single-walled Carbon Nanotube Capacitor", Snow, E.S., F.K. Perkins, E.J. Houser, S.C. Badescu, T.L. Reinecke, *Science*, **307** (2005), p. 1942.

- **April 2005:** ***Magnetic Nanoparticles Fills Up Nanotubes***

  Carbon nanotubes have been filled up with magnetic nanoparticles. The resulting magnetic nanostructures could have applications in memory devices, medicine and wearable electronics.

  "Carbon Nanotubes Loaded with Magnetic Particles", Korneva, G., H. Ye, Y. Gogotsi, D. Halverson, G. Friedman, Jean-Claude Bradley and K.G. Kornev, *Nano Letters*, **5** (2005), p. 879.

- **April 2005:** ***Au Nanoparticles to Monitor Protein Conformational Changes***

  The changes in the folding of a yeast protein were monitored by attaching gold nanoparticles to it. This could be used for sensing faulty protein folding, which plays a role in medical conditions such as Alzheimer's disease, cystic fibrosis and mad cow disease (BSE).

  "Gold Nanoparticles as a Colorimetric Sensor for Protein Conformational Changes", Chah, S., M.R. Hammond and R.N. Zare, *Chemistry and Biology*, **12** (2005), p. 323.

- **April 2005:** ***Virus Infection Monitored by Fluorescent Quantum Dots***

  Fluorescent semiconductor nanoparticles have been used for labeling the respiratory syncytial virus (RSV), which shows the increased role of quantum dots in medical imaging.

  "Progression of Respiratory Syncytial Virus Infection Monitored by Fluorescent Quantum Dot Probes", Bentzen, E.L., F. House, T.J. Utley, J.E. Crowe, Jr. and D.W. Wright, *Nano Letters*, **5** (2005), p. 591.

- **April 2005:** ***Controlled Formation of Helical Nanobelts***

  Controlling the formation of helical nanobelts from strips of semiconductor has been worked out. It has been found that the design of the spirals could be tailored by altering parameters such as the width of the belt, its crystal direction and the shape of its tip.

  "Controllable Fabrication of SiGe/Si and SiGe/Si/Cr Helical Nanobelts", Zhang, L., E. Deckhardt, A. Weber, C. Schönenberger and D. Grützmacher, *Nanotechnology*, **16** (2005), p. 655.

- **April 2005:** ***Fungus Produces Silica Nanoparticles by Bioleaching of Sand***

  The fungus fusarium oxysporum that normally causes disease in plants has been found to create nanoparticles of silica from sand through bioleaching.

  "Bioleaching of Sand by the Fungus *Fusarium oxysporum* as a Means of Producing Extracellular Silica Nanoparticles", Bansal, V., A. Sanyal, D. Rautaray, A. Ahmad and M. Sastry, *Advanced Materials*, **17** (2005), p. 889.

- **April 2005:** ***Bent Carbon Nanotubes Grown***

  Carbon nanotubes which change direction along their length have been grown; electric fields have been used to alter the orientation of the tubes.

  "Control of Carbon Capping for Regrowth of Aligned Carbon Nanotubes", AuBuchon, J.F., Li-Han Chen and S. Jin, *J. Phys. Chem. B*, **109** (2005), p. 6044.

- **April 2005:** ***Nanotube Transistor Interacts with Biological System***

  The interaction of a nanoelectronic device with an intact biological system has been demonstrated for the first time.

  "Transparent and Flexible Carbon Nanotube Transistors", Artukovic, E., M. Kaempgen, D.S. Hecht, S. Roth and G. Grüner, *Nano Letters*, **5** (2005), p. 757.

- **April 2005:** ***Multi-walled Carbon Nanotubes Aligned by Magnetic Bacteria***

  Laterally aligned multi-walled carbon nanotubes have been grown by using magnetic nanoparticles obtained from the bacterium Magnetospirillium magnetotacticum (MS-1).

"Laterally Aligned, Multi-Walled Carbon Nanotube Growth Using Magnetospirillium Magnetotacticum", Kumar, N., W. Curtis and Jong-in Hahm, *Appl. Phys. Lett.*, **86**, p. 173101.

- **April 2005:** ***High-speed Nanowire Circuits***

  Using nanoscale-building blocks, high-speed integrated nanowire circuits have been made for the first time and these could find applications in lightweight, portable electronics.

  "Nanotechnology: High-Speed Integrated Nanowire Circuits", Friedman, R.S., M.C. McAlpine, D.S. Ricketts, D. Ham and C.M. Lieber, *Nature*, **434** (2005), p. 1085.

- **April 2005:** ***Diffraction Limit Breached with Silver Superlens***

  A silver superlens, which effectively collects evanescent waves, though excitation of surface plasmons has been designed and fabricated. This can be used for imaging structures with a resolution of one-sixth of the wavelength of light, thereby overcoming the diffraction limit. This provides newer capabilities for imaging nanoscale materials.

  "Sub-Diffraction-Limited Optical Imaging with Silver Superlens", Fang, N., H. Lee, C. Sun and X. Zhang, *Science*, **308** (2005), p. 534.

- **April 2005:** ***Nanoshells for Imaging and Treating Cancer***

  Nanoshells, having absorption in the near-infrared region has been used for imaging cancerous cells. Immunotargeted nanoshells allow selective detection and destruction of breast carcinoma cells through photothermal therapy.

  "Immunotargeted Nanoshells for Integrated Cancer Imaging and Therapy", Loo, C., A. Lowrey, N. Halas, J. West and R. Drezek, *Nano Letters*, **5** (2005), p. 709.

- **April 2005:** ***Generating Triangular Silver Nanoplates on Surface***

  Highly ordered triangular silver nanoplates have been generated on a planar surface using a seed-mediated approach. This resulting substrate is a potential candidate for studying metal-enhanced fluorescence and SERS activity.

  "Rapid Deposition of Triangular Silver Nanoplates on Planar Surfaces: Application to Metal-Enhanced Fluorescence", Aslan, K., J.R. Lakowicz and C.D. Geddes, *J. Phys. Chem. B*, **109** (2005), p. 6247.

- **April 2005:** ***Nanoparticles as Enhancers for Magnetic Resonance Imaging***

  Ultrasmall iron oxide nanoparticles have been used as agents to enhance contrast at lymph nodes. Clinical tests have been conducted to successfully image and detect lymph node metastases.

  "Diagnostic Performance of Nanoparticle-enhanced Magnetic Resonance Imaging in the Diagnosis of Lymph Node Metastases in Patients with Endometrial and Cervical Cancer", Rockall, A.G., S.A. Sohaib, M.G. Harisinghani, S.A. Babar, N. Singh, A.R. Jeyarajah, D.H. Oram, J.I. Jacobs, J.H. Shpeherd and R.H. Reznek, *Journal of Clinical Oncology*, **23** (2005), p. 2813.

- **April 2005:** ***Silver Superlens for Optical Imaging at Sub-diffraction Limits***

  An optical superlens having a negative refractive index has been made from a thin layer of silver. This can be used for imaging structures with a resolution of about one-sixth of the wavelength of light,

thus overcoming the diffraction limit. This could find applications in imaging nanoscale objects with light.

"Sub-diffraction-limited Optical Imaging with a Silver Superlens", Fang, N., H. Lee, C. Sun and X. Zhang, *Science*, **308** (2005), p. 534.

- **May 2005: *Biological Systems to be Imaged at Sub-10 nm Resolution***

  By exploiting the piezoelectric effect, the electromechanical imaging of the internal structure of human teeth has been done. This technique called 'piezoresponse force microscopy', could find applications for imaging in a wide range of biomaterials at sub-10 nm resolution.

  "Electromechanical Imaging of Biological Systems with Sub-10 nm Resolution", Kalinin, S.V., B.J. Rodriguez, S. Jesse, T. Thundat and A. Gruverman, *Condensed Matter*, **0504** (2005), p. 0504232.

- **May 2005: *Nanocrystals for Detecting Genetic Mutations***

  A technique that uses nanocrystals for detecting genetic mutations has been developed, which involves the creation of a bioelectronic coding for point mutations known as single nucleotide polymorphisms (SNPs).

  "Nanocrystal-Based Bioelectronic Coding of Single Nucleotide Polymorphisms", Liu, G., T.M.H. Lee and J. Wang, *J. Am. Chem. Soc.*, **127** (2005), p. 38.

- **May 2005: *AFM Working in Liquid for Imaging***

  An atomic force microscope that works in liquid has been made which could be used for imaging biological samples, easily oxidizable materials and samples in hazardous environments.

  "Atomic Force Microscope in Liquid with a Specially Designed Probe for Practical Application", Zhang, D., H. Zhang and X. Lin, *Rev. Sci. Instrum.*, **76** (2005), p. 053705.

- **May 2005: *Attaching Amino Acids to Inorganic Surfaces***

  The adhesion of amino acids to semiconductors, metals and insulators used in electronic devices has been tested. The results have been used for designing an inorganic nanostructure which selectively binds to a specific primary peptide sequence.

  "Differential Adhesion of Amino Acids to Inorganic Surfaces", Willett, R.L., K.W. Baldwin, K.W. West and L.N. Pfeiffer, *PNAS*, **102** (2005), p. 7817.

- **May 2005: *Conductive Cantilevers for AFM***

  An atomic force microscope with an electrically insulated conductive tip has been tested. The hexagonally packed intermediate layer of the red bacterium *Deinococcus radiodurans* has been imaged.

  "Assessment of Insulated Conductive Cantilevers for Biology and Electrochemistry", Frederix, P.L.T.M., M.R. Gullo, T. Akiyama, A. Tonin, N.F. de Rooij, U. Staufer and A. Engel, *Nanotechnology*, **16** (2005), p. 997.

- **May 2005: *LED Chips Based on Semiconductor Nanocrystals***

  By replacing external color-converting phosphors with CdSe-based nanocrystals that are incorporated into GaN charge injection layers, more efficient multi-color light-emitting diodes can be made.