Subject Code : P8IE14

NANO ELECTRONICS

Introduction and Classification: Classification of nanostructures, nanoscale structure – Effects of the nanometer length scale – Change to the system total energy, changes to the system structure, vacancies in nanocrystals, dislocations in nanocrystals – Effect of nanoscale dimensions on various properties – Structural, thermal, chemical, mechanical, magnetic, optical and electronic properties.

Nanomaterials and Characterization: Fabrication methods – Top down processes – Milling litho graphics, machining process – Bottom-up-process – Vapour phase deposition methods, plasma – assisted deposition process, MBE are MOVPE, liquid phase methods, colloidal and sol gel methods

Generic Methodologies for nanotechnology: Characterization, General classification of characterization methods – Analytical and imaging techniques – Microscopy techniques – Electron microcopy, scaning electron microscopy, transmission electron microscopy, atomic force microscopy – Diffraction techniques – Spectroscopy techniques – Raman spectroscopy – surface analysis and depth profiling

Self assembling Nanostructured Molecular materials and devices: Introduction – Building blocks – Principles of self – assembly, non-covalent interactions, intermolecular packing, nanomotors – Self assembly methods to prepare and pattern nanoparticles – Functionalized nano particles, colloidal nanoparticles crystals, self-organizing inorganic nano particles, bio-nanoparticles – nanoobjects.

Nanodevices and Their various applications: Nanomagnetic materials – Particulate nanomagnets and geometrical nanomagnets – Magnetic resistance – Probing nanomagnetic materials – Nanomagnetism in technology – Carbon nanotubes – fabrication – applications – Organic FET, organic LED's – Organic, photovoltaics – Injection lasers, optical memories, electronic applications

Reference:

1. Kelsall Robert, Ian Hamley.W., Mark Geoghegan, "Nanoscale Science and Technology", Wiley Eastern 2004
2. Gregory Timp, 'Nanotechnology' Springer – Veriag, 1999
3. Charles P. Poole, Frank J. Owens, 'Introduction to Nanotechnology' John Wiley and Sons, 2003
4. Bharat Bhushan , 'Springer Handbook of nanotechnoloy' 2004
5. Michael Kohler, Wolfgang, Fritzsche, 'Nanotechnology, Introduction to nanostructuring Techniques', 2004
6. Mark Ratner, Danial Ratner, "Nanotechnology, A Gentle introduction to the Next Big idea", Pearson, 2003
7. William Goddard, Donald W. Brenner, 'Handbook of Nano Science Engineering and Technology', CRC Press 2004