

NANOTECNOLOGÍA (48 hrs.)

Profesor: Dr. Velumani Subramaniam.

OBJETIVOS: Imparting various terminologies used in the nanostructured materials and a thorough understanding of the concept of the nanostructured materials on the basis that particle less than the size of 100 nm have completely different behavior compared to the same in bulk form.

Study on varies properties like, geometric structure, electronic structure, optical properties, reactivity etc.

Various types of top-bottom and bottom-top manufacturing methodologies for molecular manufacturing and the intricacies involved in those will be dealt thoroughly.

Based on nanotechnology, the revolution taking place in the IC industries, micro machining, and fabrication of various devices will be described in detail.

Extraordinary potential for chemical synthesis or the spontaneous self assembly of molecular clusters from simple reagents producing 3 D nanostructures or quantum dots of arbitrary diameter will be described.

The requirements of miniaturization are becoming more stringent and how these nanostructured materials fulfill these requirements will be dealt in detail

Students will be asked to collect latest research publications appearing in various international and national journals and a survey of the present advancement in the synthesis and characterization of nanostructured materials will be provided.

Recent advances in the various inorganic and organic semiconductor nanostructured materials for various device applications will be reviewed.

A review on recent advances in the nanofabrication technologies in various fields of applications and its potential competence with many other existing fabrication techniques.

Course (Catalog) Description:

This course provides a broad introduction to nanotechnology, a rapidly evolving field of increasing relevance to engineering. We first explain what makes the nanoscale so different from the other length scales by considering the underpinning science (*i.e.* nanoscience) and some key examples of nanotechnology. The remainder of the course focuses on the main engineering activities of design, manufacture and testing in a nanotechnology context. Finally a thorough review and impact on the applications of nanotechnology will be given considering the today's technological advances and we'll detail how one of the most promising technologies works, and we'll discuss the potential immediate applications in various fields based on the recent international publications.

Prerequisite(s):

Fundamental Physics, Chemistry and Mathematics, preferably a good back ground on the solid state physics and chemistry.

Contenido:

TEMA 1: NANOELECTRONICS FOR ADVANCED COMPUTATION AND COMMUNICATION.

TEMA 2: FABRICATION OF ATOMICALLY CONTROLLED NANOESTRUCTURES AND THEIR DEVICE APPLICATIONS.

TEMA 3: MOLECULAR MANUFACTURING SYSTEM PREPARATION.

TEMA 4: BIOLOGICAL MATERIALS AND NANOMACHINES.

TEMA 5: RECENT ADVANCES IN NANOESTRUCTURED.

BIBLIOGRAFÍA:

- Charles P.Poole, Jr and Frank J.Owens, Introduction to nanotechnology, A John Wiley & Sons, Inc., 2003.
- Eric Drexler, Nanosystems – Molecular Machinery, Manufacturing and computation, John Wiley & Sons, Inc. US.
- Gregory Timp, Nanotechnology, AIP press, Springer Verlag Newyork, Inc.