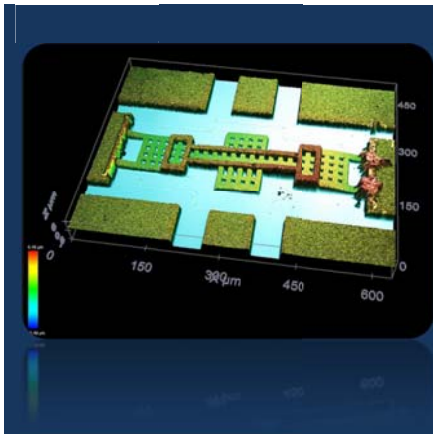




Dipartimento Ingegneria Meccanica e Industriale
Università degli studi di Roma "Roma TRE"
Gruppo di ricerca in Scienza e Tecnologia dei Materiali
Via della Vasca Navale 79 – 00146 Roma
Tel. 06.57333496 Fax 06.57333256
e-mail: segreteria@stm.uniroma3.it

Segreteria organizzativa: dr.ssa Dragana Nikolic, dada@stm.uniroma3.it

WORKSHOP – 1st ANNOUNCEMENT



NANOMATERIALS FOR PRACTITIONERS

Lecturer Dr T. S. Sudarshan
Materials Modification Inc., Fairfax, Virginia

Rome, May 28th 2012



Organizzato dal gruppo di ricerca in Scienza e Tecnologia dei Materiali
Dipartimento Ingegneria Meccanica e Industriale
Università degli studi di Roma "Roma TRE"

PRESENTATION

The workshop is designed for physicists, chemists and engineers. The primary objective is to bring attendees information on the state of the art related to nanotechnology. This course offers you a practical overview of the processes that are most widely used for synthesis and consolidation of nanomaterials and which can be used commercially for making engineering components that have significant commercial value. Your instructor will discuss not only established laboratory and industrial methods but also selected newer and emerging processes.

What Will You Learn

During the discussion of each synthesis process, you will examine a process description and the advantages and limitations of the process. You will learn methods for carrying out the process, the main process variables, and typical types of materials produced. You will be able to compare the major processes and relate them to their physical properties such as hardness, chemistry, strength, and application in various environments.

Benefit from Engineering Methods

Product life, quality, cost and maintenance are key issues in all manufacturing sectors. The design of component parts must be adequate to ensure the desired life of a product.

Parts must be able to resist aging, fatigue, corrosion and wear. Combining chemistry, physics, and mechanical engineering with metallurgy and materials science/engineering, nanotechnology will contribute to virtually all engineering applications.

The performance of most parts often depends on properties such as microhardness and strength. Although many types of treatments have been developed and are in use for modifying properties, new processes and technologies appear constantly, making the range of available treatments often bewildering. By attending this practical course, you'll learn which treatments can benefit your manufacturing operations, and how to apply them.

Who Should Attend

This course will increase your understanding of nanotechnology in a short period of time. If you specify or will use nanotechnology in your next generation of products, you should plan to attend. Design engineers, materials engineers, R&D personnel, process engineers, mechanical or manufacturing engineers, product managers, venture capitalists and others who want to learn the fundamentals and the prospects for future applications will also benefit substantially.

Workshop lecturer: Dr T. S. Sudarshan

Workshop coordination: Prof. Edoardo Bemporad

GENERAL INFORMATION

Location:

Lecture Room: N14a, Faculty of Engineering, University Roma TRE, Via della Vasca Navale 79, 00146 Rome, Italy

Preliminary Registration:

email to dada@stm.uniroma3.it, by April 24th 2012, returning the present form, filled with your contact details.

Please, do it as soon as possible, as there is a maximum allowed number of participants

The course will last from 8:30 to 17:30, with the following program (see below for scientific details)

- 8:30 to 9:00: registration
- 9:30 to 11:00: lectures
- 11:00 to 11:20 coffee break
- 11:20 to 13:00: lectures
- 13:00 to 14:00 lunch break
- 14:00 to 15:30 lectures
- 15:30 to 15:45 coffee break
- 15:45 to 17:00: lectures
- 17:00 to 17:30: open discussion

PROGRAM

During This Course You Will:

- Understand the basics of nanotechnology
- Learn which analytical techniques to use when investigating nanotechnology
- Review the major processes used in industry for synthesis
- Better understand the limitations of "standard" materials and how they can be improved with nanotechnology
- Make objective comparisons between processes, free of commercialism
- Learn to identify the technique best suited for a particular application
- Learn whether to change materials for a component or apply a nano surface treatment
- Learn how to evaluate the cost effectiveness and productivity of various nanotechnologies
- Understand the capabilities of new processes that may revolutionize your industry
- Discover how to improve manufacturing productivity and product quality

First will be provided an **overview of the field** which includes societal concerns and then focus on synthesis methods for functional nanoparticles. We will show how it survived the "valley of death" from the laboratory to manufacturing for selected products. Important theories and examples will be given through the discussion of a number of new products and processes using various technologies.

This will be followed by wet **synthesis methods and chemistries used to produce polymer and other coated particles in the 10-1000 nanometer range**. Careful attention is paid to the analytical techniques that allow confident measurement of phase-separated structure within these composite particles and the varied applications of such particles. The objectives are to:

- Introduce the diversity of particle sizes, shapes, and chemical composition with structural control at the nano scale
- Describe how particles can be made from either reactive or non-reactive processing techniques

The next section will focus on **taking these particles and forming them into a useful engineering shape**. The various consolidation methods and the pros and cons of each method will be described along with classic examples from the literature

In the next section we will focus on **characterization (analysis and verification) and the wide range of application areas of economic importance**. The objectives are to:

- Demonstrate how particles can be characterized by modern instrumental techniques
- Discuss the multitude of applications for nanoparticles
- Provide an interactive learning experience through the use of individual and group exercises and case studies

Finally we will talk about the **health and safety issues in nanotechnology**

- Introduction
- Problems and Obstacles in Nanotechnology
- Societal Concerns and Ethics and Regulations
- Properties of Nanomaterials - Hall Petch Relationship
- Synthesis of Nanoparticles - oxides and non-oxides, carbides, nitrides and borides
- Spray Processing
- Chemical methods -Sol-gel and Electroplating
- Plasma methods
- Vapor based methods
- Mechanical Milling
- Consolidation of Nanoparticles
- Hot Isostatic Pressing
- Hot pressing
- Explosive Consolidation
- Ultra High Pressure Consolidation
- Plasma Pressure Compaction
- Electroconsolidation
- Thermal Spray methods
- Other miscellaneous approaches
- Applications of Nanomaterials
- Composites
- Magnetic Materials
- Polishing abrasives
- Electronics Applications - Flat Panel Displays,
- Sputter Targets
- Structural materials
- Sensors
- Coatings
- Functionally Graded Composites
- Nanomaterials and Health and Safety
- Future of Nanomaterials and Coatings

INFORMATION ABOUT THE LECTURER

T. S. SUDARSHAN

Materials Modification Inc.

Fairfax, Virginia

Dr. T. S. Sudarshan, co-founder of Materials Modification Inc. (a company that emphasizes nanomaterials and coatings), originated and has served for the past 22 years as lead organizer for the series of international conferences on surface modification technologies. Dr. Sudarshan is active in the research, development and application of powders and coatings technology. His experience includes three years in the truck and bus division of Ashok Leyland, where he handled process control, heat treatment, quality assurance and failure analysis problems.



Dr. Sudarshan's published writings include more than 170 papers and 26 books on surface modification technologies and two books on rapid solidification technology and intermetallic and ceramic coatings. Holder of 18 patents, Dr. Sudarshan is also co-editor of two major journals, *Materials and Manufacturing Processes* and *Surface Engineering*. He has taught courses worldwide in failure analysis, nanomaterials and surface engineering. He is a Fellow of ASM, Fellow of IFHTSE, Fellow of IMMM, past chairman of the Surface Engineering Division of ASM, past member of the National Materials Advisory Board and has served as an advisory member of the Advance Materials Research Institute at the University of New Orleans and is on the editorial board of several journals. Dr Sudarshan also serves on several committees for the US Government and is a Board member for the CREST program at Alabama State University.

URL: <http://www.matmod.com>

REGISTRATION FORM

NANOMATERIALS FOR PRACTITIONERS

May 28th 2012

No registration fee

Registration form should be filled-and sent to the Organization office before April 24th 2012 : Tel. +39.06.57333496
Fax: +39.06.57333256 e-mail: dada@stm.uniroma3.it

Surname.....

Name.....

Company.....

Address.....

CAP.City..... Prov..... Country

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