

# CHINMAY SOMAN

Graduate Student • Interdisciplinary Program in Materials Science • Vanderbilt University

## **SUMMARY OF STRENGTHS AND SKILLS**

- Strong interdisciplinary research experience in bio-conjugate nanomaterials and systems.
- Excellent inherent analytical and reasoning skills, as well as a multidisciplinary approach to problem solving, have all been honed by higher education and research experience.
- Excellent oral and written communication, sharpened by numerous technical and non-technical presentations and writing.
- More than ten years of leadership and management experience acquired by leading and organizing curricular and extracurricular activities.

### **Research Skills:**

<b>Materials Synthesis</b>	<i>Nanoparticles:</i> synthesis of metal, metal oxide and semiconductor nanoparticles, using wet chemical or biological methods. Organic and polymer capping of nanoparticles.
	<i>Thin Films:</i> lipid and polymer film deposition on metal surfaces: solution phase, vacuum deposition, Langmuir-Blodgett methods, drop casting.
	<i>Conjugate Materials:</i> Covalent and electrostatic conjugation of biological molecules with nanoparticles and thin films. Modification of biological molecules.
<b>Materials Characterization</b>	<i>Microscopy:</i> Transmission and Scanning Electron microscopies, Scanning Probe microscopies.
	<i>Spectroscopy:</i> UV-Vis, FTIR, fluorescence, EDAX.
	<i>Other:</i> XRD, Dynamic Light Scattering, ToF Mass Spectroscopy Ellipsometry, Quartz Crystal Microbalance.
<b>Other</b>	<i>Biological:</i> Extensive Flow Cytometry experience, Coulter Counter, Small animal imaging (CT and MRI). Acquainted with cell culture.

## **EDUCATION**

### **Vanderbilt University**

**Nashville, TN**

August 2002 – Present

GPA: 3.7/4.00

PhD, Interdisciplinary Materials Science

- Invented and patented a novel nanoparticle based system for proteomic profiling. (Published in *Langmuir*, 2008)
- Synthesized metal oxide particles for image contrast enhancement.
- Selected Coursework: Nanoscale Science and Engineering, Materials Chemistry, Molecular Aspects of Chemical Engineering, Electron Microscopy, Biochemistry, Electrochemistry, Immunology, and Biotechnology.

### **Government College of Engineering, University of Pune**

**Pune, India**

July 1998 – July 2002

Class standing: 5/60

Bachelor of Engineering *with Distinction*, Metallurgy

- Extracurricular study and research on various nanoscale materials.

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## RESEARCH EXPERIENCE

### Vanderbilt University

Nashville, TN

August 2004 – Present

Advisor: Dr. Todd Giorgio

Graduate Research Assistant

Biomedical Engineering Department

#### Nanoparticle Based Diagnostics and Targeted Drug Delivery:

The primary focus of my current research is to design, synthesize and evaluate organic-inorganic conjugate nanoparticles for various applications in biomedical diagnostics and targeted drug delivery. Projects include:

- Nanoparticle-antibody conjugate based system for easy detection of sub-picomolar antigens, to enable very early diagnosis and prognosis of diseases. We have developed and patented a novel detection strategy that enables a simple yet highly sensitive simultaneous detection of multiple biomarkers.
- Ligand coated metal and metal oxide nanoparticles for drug delivery, CT and MRI contrast enhancement, and hyperthermia based treatments.

June 2003 – August 2004

Advisor: Dr. David Cliffl

Graduate Research Assistant

Department of Chemistry

#### Electroactive Nanoparticle-Protein Conjugates:

The objective of this research was to synthesize and characterize a bio-inorganic nanoparticle conjugate and study the effect of conjugation on the electrochemical activity of the protein. Possible applications of this research are in molecular electronics, nano-scale sensors and bio-inorganic photovoltaics. The salient parts of this project were:

- Synthesis and characterization of monolayer protected gold clusters (MPCs).
- Conjugation of covalently modified Cytochrome-c with MPCs.
- Electrochemical characterization of cytochrome-c/MPC conjugate.

### National Chemical Laboratory

Pune, India

June 2000 – June 2002

Advisor: Dr. Murali Sastry

Undergraduate Research Assistant

Nanomaterials Science & Technology Group

#### Synthesis and Characterization of Various Nanoscale Materials:

Worked on a range of different projects involving synthesis and characterization of a variety of nanomaterials including metal nanoparticles and enzyme conjugates of these nanoparticles, Langmuir-Blodgett and vacuum deposited lipid multi-layers with encapsulated metal ions.

## TEACHING EXPERIENCE

### Vanderbilt University

Nashville, TN

Fall 2002, Spring 2003, Fall 2004, Spring 2005

Materials Science and Engineering

Assisted in teaching of two undergraduate level laboratory modules - *Materials Science I*, and *Strength & Structure of Engineering Materials*, and a graduate level course – *Atomic Arrangements in Solids*. Excellent student feedback for all the courses.

Duties ranged from designing and delivering laboratory presentations, supervising laboratory sessions and grading lab reports for the undergraduate courses; to assisting in problem solving, conducting course review sessions and grading homework and exams for the graduate course.

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## **PUBLICATIONS**

### **Patent application:**

Nanotechnology for ultra-sensitive detection of biomarkers, **2007**

### **Papers:**

Quantum Dot Self-Assembly for Protein Detection with Femtomolar Sensitivity, Chinmay Soman, Todd Giorgio. *Langmuir* **2008**

Preparation, Characterization, and Enzymatic Activity of Fungal Protease-Gold Colloid Bioconjugates; Anand Gole, Chandravanu Dash, Chinmay Soman, S. R. Sainkar, Mala Rao, and Murali Sastry. *Bioconjugate Chemistry*, **2001**

### **Presentations:**

*Annual Nanoscience and Nanotechnology Forum: Invited talk* on Quantum dot based antigen detection technology and business plan. Vanderbilt University, **2007**

*NanoNexus 2007: Business plan competition for early stage nanotechnologies.*

Quantum Dot Enabled Multiplexed Antigen Profiling. 2<sup>nd</sup> Runner Up prize. Oak Ridge National Laboratory, **2007**

*Innovation 2002: National Level College Research Conference*, Enzyme-Colloidal gold bioconjugates, 1<sup>st</sup> prize in the Bio-Nano Technology session. Cummins College of Engineering, Pune, India, **2002**

### **Posters:**

*Center for Nanophase Materials Science User Meeting* Iron Oxide Core/Polymer Shell Nanoparticles MRI Contrast Agents and Drug Delivery Vehicles, Oak Ridge National Laboratory, **2006**

## **EXTRACURRICULAR**

- Founder and chief contributor of 'The 81 Entrepreneurs' - a group for fostering entrepreneurship, **2005-current**
- Participated in national rowing competitions in India. **1999, 2000, 2001**
- Boat Club Treasurer: Managed the \$80,000 (PPP) fund for infrastructural improvements and day-to-day activities at the College of Engineering Boat Club, **2001-2002.**
- Regatta Treasurer: Led the team that raised \$25,000 (PPP) in corporate sponsorship. Doubled the sponsorship amount over the previous year, **2000-2001.**
- Best Freshman Oarsperson: Won the trophy for exceptional involvement and achievement in Boat Club activities, **1998-1999.**
- Won the award for best science fiction in college magazine writing competition, **1999**