

# NUSNNI FOCUS GROUPS

**FOCUS GROUP:** Health and Environmental Impacts of Nanomaterials

**FOCUS GROUP CHAIRS:** Dr Liya Yu (Environmental Science & Eng, FOE);

A/Prof Suresh Valiyaveetil (Chemistry, FOS);

A/Prof Ong Wei Yi (Anatomy, FOM)

## Focus Group Information

### 1. Objectives & Planned Deliverables

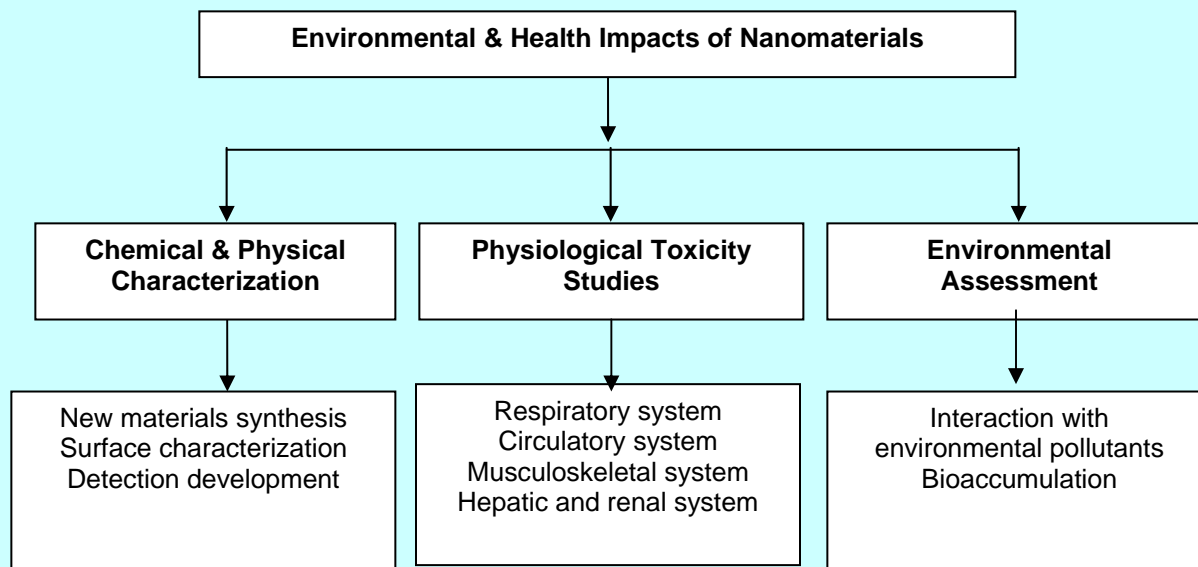
Nanotechnology and nonmaterial have found extensive use in recent years in a number of contexts (e.g., sunscreens, composites, medical devices, and chemical catalysts), and their impact on technology and daily life is expected to grow significantly in the coming years. One of the concurrent and emerging challenges of the development of nanotechnologies is to understand the potential impacts of nanomaterials on human health and environments.

This focus group aims to systematically evaluate the potential environmental and health effects of nanomaterials through multi-disciplinary approaches, drawing on the expertise in engineering, science and medicine. The questions that need to be addressed include how size, number, chemical composition and surface characteristics of nanoparticles affect their fate in the environment and interaction with various systems of the body.

It is envisioned that the findings derived from the multi-disciplinary studies can establish the knowledge base for systematic testing and long-term development of nanotechnologies.

### 2. Research Plan & Focus

The research program comprises three focus areas, as shown in the chart below. Each focus area consists of an interdisciplinary team drawn from the Faculties of Engineering, Science, and/or Medicine.



#### Target Area 1: Chemical & Physical Characterization

The first focus area aims to systematically establish a knowledge base for effective characterization and to provide

guidelines for toxicity control. This is carried out by synthesizing different classes of nanoparticles in desired sizes (1-50 nm) with various surface properties so that their environmental and health effects may be studied systematically.

This focus area also serves as in-house synthesis and characterization center, providing nanomaterials for use in the second and third focus areas.

### **Target Area 2: Physiological Toxicity Studies**

The second area is to systematically establish the exact way in which nanoparticle exposure could affect body systems, using cell culture and *in vivo* animal models. Four major systems of the body (respiratory, circulatory, hepatic/renal, and nervous systems) and potentially associated health effects are to be evaluated.

<b>Systems</b>	<b>Potential Health Effects</b>
Respiratory	Asthma; Lung cancer
Circulatory system	Endothelial damage, bone marrow problems
Hepatic & Renal system	Liver & kidney damage
Nervous system	Brain damage (Neurodegeneration)

### **Target Area 3: Environmental Assessment**

Many nanoparticles used in electronic industries or applied materials industries can enter the water and air environments. They may also react with pollutants in the water and air environments, leading to the generation of new and possibly toxic compounds. This focus area is to study the interactions (e.g., adsorption) between inorganic / organic pollutants and nanoparticles in the aquatic environment. This will help to understand the role and fate (facilitated transport and bioavailability) of pollutants that are associated with nanoparticles.