

## **NanoBioMaterials: How Useful are they?**

**Professor Subbu Venkatraman**

School of Materials Science & Engineering, Nanyang Technological University, Singapore

There has been substantial buzz about nanobiomaterials in the scientific literature for the past decade. Broadly speaking, nanobiomaterials have been considered for drug delivery, *in vivo* imaging, *in vitro* diagnostics and less convincingly, for engineering of soft tissue. In this talk, I will give an overview of the work in these four areas, with emphasis on the NTU efforts. We have developed several nanocarriers for drug and gene delivery, particularly liposomes and erythrocyte-derived carriers. Our Centre for Biomimetic Sensor Science has been focusing on polymerosomes not only for diagnostic applications, but also for mimicking cellular function; such understanding will enable us eventually to design synthetic “protocells” that may play an interesting role in tissue engineering. In *in vivo* imaging, the thrust is on developing nanoparticles that localize or can be made to localize in selected tissues, to enhance contrast and resolution in MRI and ultrasound imaging. Finally, in the area of soft tissue engineering, there is considerable effort in studying nanopatterns for guiding cellular growth and proliferation on biomaterial surfaces. In specific situations, there are indications that cells do respond to such patterns, occasionally also in 3-dimensional systems. Our work on nanostructuring in hydrogels will be presented as an example of how cell growth is influenced in 3-D systems.