



School of Materials Science and Engineering



**Seminar Topic:  
Unveiling the Phase Transformation at Nano Scale**

**Associate Professor Huang Yizhong**

**Abstract**

Phase transformation is a common event in the research of materials science. It involves either crystalline structured or compositional conversion when materials are subjected to external environments. Understanding the phase changes is of importance in tailoring design and synthesis of a specified material that is selective for the desirable performance. X-rays and electron beams are powerful sources enabling the determination of the variation of phases.

In this talk, unveiling the transformation of amorphous  $\text{GeO}_2$  into crystalline  $\text{GeO}_2$  with the presence of water is covered. The dynamic process of the phase transformation is observed by *in-situ* TEM liquid cell which is sealed and permits the water flow inside TEM during electron beam imaging. We demonstrated that the phase conversion starts with hydrolysis of amorphous  $\text{GeO}_2$  followed by the formation of clusters and the nucleation of crystal. Moreover, the development and evolution of dense liquid clusters during the process of nucleation is directly observed. All the results not only indicate the clusters behave as the basic building units for crystallization, but also suggest that the development of the dense liquid clusters provides favorable prenucleation position and become a necessary step for nucleation from solution, which strongly enriches the understanding of crystallization from solutions.

In addition, the phase transformation under electron beam irradiation to Au and CuO nanostructures will be briefly addressed.

**Biography**

Dr Huang Yizhong is currently an Associate Professor at School of Materials Science and Engineering in Nanyang Technological University Singapore. He has been working in University of Oxford as a postdoc and then Research Fellow (faculty member) and College Fellow of Wolfson and now an Academic Visitor. Dr Huang has been honored with a few awards such as Chutian Scholar of Wuhan University of Technology in 2019 and UK-Southeast Asia Partners in Science Collaboration Development Awards in 2012. He has published over two hundred and fifty papers in journals such as Nature communications, Nano Letters, Advanced Materials and ACS Nano.

Dr Huang has developed expertise in transmission electron microscopy (TEM) and focused ion beam (FIB) system with specific research interests in nanoelectrochemistry and hybrid nanostructured materials.

**Wednesday, 3 February 2021 || Time: 2:00 pm - 3:00 pm ||**  
**Live Streaming Link (Zoom Meeting): <https://ntu-sg.zoom.us/j/93170194862>**  
**Meeting ID: 931 7019 4862 Passcode: 030221**  
**Hosted by: Associate Professor Dong Zhili**