



**Seminar Topic:**

**Ternary Nickel Phosphorus Alloys as More Reliable Lead-free Metallizations: Metallurgy at Microscale**

**Professor Chen Zhong**

**Abstract**

In the field of solder joining in electronic packaging, we have witnessed the transition from tin-lead soldering to lead-free, driven by environmental & health concerns, as well as commercial competition over the last two decades. A serious issue related to the implementation of lead-free soldering is the augmented reliability challenges due to the exponentially accelerated interface reaction. On the substrate side, different materials can be used to ensure strong joining and prolonged service life. Among them, electroless Ni alloys have been extensively used by the industry due to their easy processability, good conformity, and non-reliance on electrical connection. In this talk, three electroless plated ternary Ni alloys are explored for their potential to improve the joint reliability over the conventional binary Ni-P alloy. In the comparison, metallization consumption rate and resistance to joint strength degradation over long-term aging treatment are used as indicators for the long-term reliability of the solder joint. Through these examples, I wish to illustrate how materials science principles are applied in designing the metallization systems to ensure a slower interface reaction and retained joint strength, thus ensuring a more reliable solder interconnection.

**Biography**

Prof Chen obtained his PhD from the University of Reading, United Kingdom, under the sponsorship of an ORS award and a European Union research grant. He joined the newly established Institute of Materials Research and Engineering by the National Science and Technology Board (NSTB, currently known as A\*Star) in early 1997. In March 2000, he moved to Nanyang Technological University (NTU) as an Assistant Professor and has since been promoted to Associate Professor and Professor, in the School of Materials Science and Engineering. Since joining NTU, he has graduated 30 PhD and 5 MEng students. Prof Chen has also supervised over 200 undergraduate projects (FYP, UROP, URECA). In July 2010, he received a Certificate of Honour from NTU for his "Inspirational Mentorship" to nurture an MSE Koh Boon Hwee scholar.

Prof Chen's research interests include 1) Surface Engineering, Thin Films & Nanostructured Materials, and 2) Mechanical Behaviour of Materials.

**Wednesday, 23 October 2019 || Time: 2:00 pm – 3:00 pm**  
**Venue: MSE Meeting Room (N4.1-01-28)**  
**Hosted by: Professor Raju V. Ramanujan**