

First Laureate Applied Research



- **Research Work Title:** Original Contributions to the Coordination bond-band Theory

- **Researcher:** Dr. Sun Chang Qing
- **Nationality:** Singapore
- **Field:** Physical Science
- **Position:** Associate Professor, FRSC, Finst P
- **Scientific Affiliation:** Nanyang Technological University, Singapore

Abstract:

KIA recognizes Dr Chang Q Sun for his original contributions to the advancement of coordination bond and electronic engineering, with breakthroughs in: 1) bond-band-barrier (3B) correlation for C, N, O chemisorption 3B dynamics; 2) extended Ice Rule for hydrogen-bond relaxation & H₂O anomalies; 3) bond-order-length-strength (BOLS) correlation for the physical chemistry of defect, surface, and nanosolid; 4) nonbonding electron polarization (NEP) at undercoordinated sites; 5) local-bond-average approach for solid meso-mechanothermal dynamics; 6) BOLS-TB algorithm for edgestates discrimination; 7) zone-selective photoelectron spectroscopic (ZPS) purification of bonds & electrons associated with undercoordinated defect and surface atoms and heterocoordinated interfaces; 8) Raman quantification of the length, energy, compressibility, Debye temperature, force constant & relaxation dynamics of bonds; 9) STM/S/VLEED quantification of 4-stage Cu₃O₂ bonding kinetics; & 10) functional materials devise, etc. Evidencing his spirit, perseverance, and dedication, his achievement has laid multidisciplinary foundations towards engineering bonds and electrons at will for designer materials.

Biography:

Dr Chang Q Sun received a BSc in 1982 from Wuhan University of Science and Technology and an MSc in 1987 from Tianjin University, China. He completed his PhD in 1997 at Murdoch University, Australia and then joined Nanyang Technological University in 1997 as academia up to date. Dr Sun has published over 220 principally-authored journal articles, 4 book chapters, 4 patents, and 9 themed reports in Chemical Reviews, Progress in Materials Science, and Progress in Solid State Chemistry, etc., His work has received over 4000 citations. His BOLS theory has been adopted as teaching materials by institutes in multiple nations. He was conferred the Inaugural Nanyang Award of Research in 2005 and elected as Fellow of the Royal Society of Chemistry (FRSC, 2006), Institute of Physics (FInstP, 2007). He is currently on the Editorial Advisory Board for 5 journals and holding honorary appointments at Xiangtan University and Jilin University.

