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Prof. Zhaoxiong Xie received his BSc (1987) and PhD (1995) from Xiamen University, China. After one-year post-doctoral research in Centre d'Etudes de Saclay, France, he returned to China and served as Associate Professor in 1999 and later as Dean of Chemistry and Chemical Engineering at Xiamen University, China till now.

Prof Xie's research focuses on structural chemistry of surface and interfaces, including studies of the control of the surface/ interface structure of nanocrystals and their related properties. To date Prof Xie has published 268 peer-reviewed research journal publications. His current H index is 45, and he has received over 13355 citations up to now (Researcher ID: G-3416-2010).

Prof Xie received awards from Chang Jiang Scholars Program, Ministry of Education, China (2014), the National Distinguished Young Scientist Grant of China (2007), the New-century Excellent Talent Support Program, Ministry of Education, China (2004) and the University Youth Scholar Grant of Fok Ying Tung Foundation (2004)

Control of the surface structure of functional micro-/nano- crystallites

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Many physical and chemical properties of crystals depend on the surface structures because of the anisotropic properties of crystal. In past several decades, surface chemists have acquired great achievements on the studies of surface structure dependent properties by applying bulk single crystals. However, in many applied fields, such as catalysis, nanocrystals are concerned. It is therefore very important to achieve nanocrystals with different crystal surface.

As has been known, nanocrystals with exposed high-energy crystal facets usually show higher chemical activities, due to abundant unsaturated coordination atoms and atomic steps and ledges. However, in order to minimize the surface energy of the crystals, the high-energy facets quickly disappeared in the crystal growth process. In recent years, numerous efforts have been paid to the control of surface structure, especially for those surfaces with high surface free energy. However, it is still extremely difficult to design the surface structure of nanocrystals, and general synthetic strategies are still lack. We focused on developing methods for controlled syntheses of noble metals, metal oxides micro-/nano- crystallites with specific crystal facets, especially high-energy facets. We successfully controlled surface structures of series functional metal oxide nanocrystals and noble metals with high-energy facets including Au, Pd, Pt, TiO_2, SnO_2, Cu_2O, Ag_2O, CeO_2, Fe_2O_3 etc. More importantly, deduced from thermodynamics and the Thomson−Gibbs equation, we proposed that surface energy of nanocrystals can be simply tuned by varying the supersaturation of growth unit during the crystal growth, which has been demonstrated to be a universal way for controlling the surface structure, including ionic, molecular, metal and metal oxide micro/nanocrystals with high-surface-energy faces. This finding successfully explain a set of seemingly contradictory observations in the synthesis of NCs.