

Measurements of Electron Densities in Solids

Jian-Min Zuo*, Department of Materials Science and Engineering,
University of Illinois, Urbana-Champaign, Urbana, IL. E-mail:
jianzuo@uiuc.edu

This talk reports the recent progress in the measurement of electron densities in inorganic crystals and its significance for our understanding of bonding and electronic structure [1]. The talk is organized in two parts. The first part first emphasizes the importance of accuracy in experimental structure factors for electron density mapping and the challenge of studying inorganic crystals, which is then followed by an introduction of the convergent beam electron diffraction technique for accurate structure factor measurement. The second part of the talk reports the study of electron density in several inorganic crystals of materials interest with focus on transition metals and ions. Comparison between experiment and theory will be made to highlight the significance of experimental electron density and the need for further study. The talk will be concluded by looking into future challenges and opportunities in materials science for crystallography.

* The talk is based on work performed in collaboration with B. Jiang, M. Kim, M. O'Keeffe and J.C.H. Spence. The work was supported by NSF and the author thanks DOE BES for supporting his current research.

[1] Zuo J.M., *Reports on Progress in Physics*, 2004, **67**, 2053-2103.

Keywords: electron density, electron diffraction, crystal electronic structure