1. Subjects of Research

(1) Growth and characterization of well-aligned 1-D RuO$_2$ and IrO$_2$ Nanocrystals. Study the possible applications of these nanostructured oxides.

(2) Develop contactless nondestructive optical characterization techniques; (i) modulation spectroscopy, (ii) surface photovoltage spectroscopy and (iii) Raman scattering, for semiconductor characterization.

(3) Growth and characterization of single crystals of transition metal dichalcogenides and dioxides with pyrite, layered or rutile structures by using flux, chemical vapor transport or physical vapor transport methods.

2. Recent Research Topics

(1) Growth and characterization of well-aligned one-dimensional RuO$_2$ and IrO$_2$ nanocrystals via RF sputtering and MOCVD methods. A detailed characterization program including XRD, EDX, FESEM, TEM, XPS and Raman scattering are used for these 1D materials study. The study of field emission properties of the vertically-aligned oxide-nanotips and demonstrated as the high performance and robust field emitter materials owing to their low work function, low resistivity and excellent stability against oxygen.

(2) Using modulation spectroscopy, surface photovoltage spectroscopy and Raman scattering for semiconductor characterization including bulk/thin films.
(3) Growth and characterization of single crystals and nanocrystals of transition metal dichalcogenides and dioxides with pyrite, layered or rutile structures by using flux, chemical vapor transport or physical vapor transport methods

3. Selected Publications and Projects

(1) Publications


(2) Projects

(i) Nanostructured conductive oxides: RuO$_2$ and IrO$_2$ (National Science and Technology Program for Nanoscience and Nanotechnology, 2004-2007)

(ii) Optical properties study of novel optoelectronic semiconductor materials, low dimensional nanostructures and device structures (NSC: 2005-2008)

(iii) Growth, characterization and possible applications study of transition metal dioxide and dichalcogenide compounds: single crystals, films and their nanosized structures (NSC: 2005-2008)