DESIGN AND ELECTROCHEMICAL STUDIES OF NANOMATERIALS AND NANOCOMPOSITES FOR CLEAN ENERGY APPLICATIONS. **Aicheng Chen**, University of Guelph, Electrochemical Technology Centre, Department of Chemistry, 50 Stone Road East, Guelph, Ontario N1G 2W1, Canada. (aicheng@uoguelph.ca)

With rapidly mounting environmental concerns, coupled with the accelerated depletion of fossil fuels, there is a significant demand for the development of advanced technologies for sustainable energy production. Nanostructured materials with high surface areas have garnered significant interests due to their unique properties and impressive applications spanning electrocatalysis, photocatalysis, energy conversion and storage. Recently, our research team has designed and investigated a variety of functional nanomaterials. In this talk, the design and synthesis of advanced cobalt, palladium, ruthenium and graphene-based nanomaterials and nanocomposites are presented. The obtained nanomaterials and nanocomposites were studied by various surface characterization techniques (e.g., Raman spectroscopy, Fourier transform infrared spectroscopy, X-ray diffraction (XRD), high-energy XRD, scanning electron microscopy, transmission electron microscopy, energy-dispersive X-ray spectroscopy, and X-ray photoelectron spectroscopy) and electrochemical methods. The electrochemical properties of these nanomaterials as well as their promising applications in hydrogen production and storage are highlighted. The critical roles of nanostructured surfaces in the development of advanced electrochemical technologies for clean energy applications will be discussed.