

Ionic and mixed ionic-electronic conductors – materials for future energy technologies (KJM/MENA- MSc/BSc)

Oxides conducting protons and/or oxide ions (ionic conductors), and mixed ionic and electronic (electron and electron holes), are central in development of sustainable energy interconversion technologies. This could typically be production of H_2 from “green” electricity by electrolysis and utilizing H_2 in a fuel cell, or production of NH_3 following electrochemical routes. Obviously, development of these technologies is essential to a future carbon neutral society.

The goal of the projects will be to synthesize and characterize the properties of new oxide based materials for electrodes or electrolytes of high temperature electrochemical devices. In doing so, we will develop essential insight of structure, microstructure and defect structure to functional processes in the oxides under operation in of sustainable energy interconversion technologies.

The figure illustrates one potential working principle for electrochemical synthesis of ammonia with proton conducting electrolyte.

