Abstract: Primary water nuclear reactor fuel cladding materials are subjected to harsh environmental conditions and multiple degradation processes such as corrosion, irradiation and mechanical stresses, which are most of the time coupled. The coupling results in accelerated degradation phenomena significantly limiting the material’s lifetime. Thus, it is critical for the nuclear industry to understand these coupling mechanisms in order to better predict the lifetime and the replacement frequency of nuclear materials. However, these degradation processes are often complex and involve multiple length and time scales, which make them particularly difficult to model and study experimentally. It is thus essential to develop efficient modeling tools and innovative experiments allowing to validate and verify the environmental degradation models in normal and accidental conditions. This seminar focuses on the development of new methodologies to study the environmental degradation coupling mechanisms, specifically mechanistic links between hydrogen pick-up, oxidation rate, alloy chemistry, and microstructure for zirconium alloy fuel cladding for normal and Loss Of Coolant Accident (LOCA) conditions.

Biography: Adrien Couet is an Assistant Professor for the department of Engineering Physics at the University of Wisconsin-Madison, specialized in the degradation of nuclear materials. Previously, he worked as a research engineer for Electricite de France (EDF) in France, the world’s largest nuclear company. Couet holds a PhD and Master in Nuclear Engineering from Penn State University, and a Master of Engineering Physics from Ecole Centrale de Lyon (France). His previous and current work covers topics such as coupling mechanisms between corrosion and mechanical stresses for various types of nuclear materials, hydrogen pickup and corrosion of nuclear fuel cladding in service and accidental conditions, and the effects of electromagnetic waves and irradiation damage on nuclear materials corrosion mechanisms.

Tuesday, April 12, 2016
4:00 pm
Room 106 Engineering Research Building
1500 Engineering Drive