INTERNATIONAL NUCLEAR ENERGY RESEARCH INITIATIVE

Characterization Methods for Anisotropy and Microstructure of TRISO Particle Ceramic Layers

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Project Abstract

The resurgence of coated particle fuel as a cornerstone technology for the next generation of nuclear reactors requires improved characterization methodology for process development and product qualification. This project consists of two elements. Element 1 compares two systems for measuring the anisotropy of the pyrocarbon layers in tri-isotropic (TRISO)-coated particle fuel. Pyrocarbon anisotropy is an important parameter related to fuel irradiation performance. High pyrocarbon anisotropy can lead to non-uniform shrinkage in the pyrocarbon layers that may result in cracking and failure of the coating layers. ORNL measures anisotropy using their newly developed, two-modulator generalized ellipsometry microscope (2-MGEM). CEA uses a more traditional optical polarimeter technique called RAPAX. Element 2 investigates the use of X-ray analysis as a non-destructive technique for quality control.