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## Structural modification in irradiated UO<sub>2</sub> fuel investigated using micro-XRD and micro-XAFS spectroscopy

*Friday, 16 September 2011 13:25 (2 minutes)*

Uranium dioxide nuclear fuel, UO<sub>2</sub>, with fissile <sup>235</sup>U is normally used in commercial power plants. Fission of <sup>235</sup>U generates light and heavy fission fragments and disturbs both cation-cation and cation-anion network in the fuel matrix. Uranium dioxide can also exist as a hyper-stoichiometric UO<sub>2+x</sub> following oxidation. Nonstoichiometry in UO<sub>2</sub> fuel may result a decreased thermal conductivity, increased thermal expansion and/or a greater volatility and fission FP release rate. In this work micro-focused X-ray diffraction (XRD) and X-ray absorption fine structure (XAFS) spectroscopy are used to examine the lattice structure of UO<sub>2</sub> and next the neighbor atomic environment of uranium in a UO<sub>2</sub> pellet irradiated to a medium burn-up condition. Micro-structures evolved at two different radial positions, the center-region and the rim-area, of the irradiated fuel pellet are examined. Results are compared with the corresponding results of an unirradiated (pristine) UO<sub>2</sub> pellet. Structural changes in the irradiated UO<sub>2</sub> grains, lattice parameters, local distortion and lattice dilation in the irradiated material are also measured from XRD data. All these results will be presented and discussed.

### Please specify the session

Poster session I on 15.09.2011

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Poster

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