Type of presentation: Poster

**MS-7-P-2360 EELS study of the carbon speciation of the pyrocarbon interphase in SiC/SiC composites before and after neutron irradiation**

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Silicon carbide ceramic matrix composites (SiC/SiC), made of SiC fibers embedded in a SiC matrix, are considered as a potential material for advanced fission as well as for fusion structural applications. A thin layer of pyrolytic carbon (PyC) is an integral part of the composite material since it transfers the mechanical loads from the matrix to the fibers. These 20 to 50 nm coatings deposited on the SiC fibers also play an important role in the effective thermal conductivity of the composite material. The effects of irradiation on this graphite-like layer and the link to subsequent changes in the thermal conductivity of the composite requires further research.

To accomplish this, an electron energy loss spectroscopy (EELS) study is carried out on the PyC layer of nuclear grade SiC/SiC samples which were exposed in pile in the High Flux Reactor (HFR) at Petten [1]. TEM lamellas are prepared from small capsules which were exposed as well as from unexposed material from the same batch. The amorphization of the PyC layer due to neutron irradiation might result in a change in the carbon speciation, from sp2 to sp3. To verify this, the core-loss part of the EELS spectra of the irradiated and pristine materials are compared to identify a possible amorphization. This method has been successfully reported by Yan et al. in [2], whereby the mechanical properties of unirradiated SiC/SiC samples were studied. Last, the effect of this microstructural change on the mechanical and thermal properties of the SiC/SiC composite are discussed. Indeed, a highly orientated PyC layer is desirable as far as mechanical properties are concerned [3,4], whereas the thermal conductivity of amorphous carbon is higher than that of pyrolytic carbon along its c-axis.

Bibliography