TEM STUDY OF IRRADIATED FAST REACTOR MOX FUELS

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Nuclear fuels are severely impacted by radiation damage occurring during irradiation in reactor mainly by fission but also during storage/disposal by alpha-decay.

The type of reactor in which the irradiation takes place and the nature of the fuel determines the magnitude of the damage produced. For example, the burnups achieved can vary substantially between Light Water Reactors (LWR) and Fast Reactors (FR). Also the irradiation temperatures in these two types of reactors vary resulting in different final states of the fuel after irradiation.

Experimental analyses by TEM of irradiated MOX fuels with different burnups (LWR and FR), but also of transmutation fuels (SUPERFACT) will be reported. The impact of damage and the microstructure evolution on some properties such as thermal conductivity, mechanical properties and fission gas release will be presented.

In consideration of further accumulation of radiation damage (mainly from alpha-decay) during post-irradiation cooling, some observations on the microstructure of different fuels will be reported and integrated in the overall description of fuel evolution and properties modification during storage. To this respect archived samples and irradiated ones have been compared to assess the damage formation solely due to the alpha activity.