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## Structural studies of neutron irradiated ferritic alloys for advanced nuclear reactors

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The rapidly growing demand for energy and the need for alternatives to limit the environmental impact of natural fossil-based fuels have reinitiated a worldwide interest in advanced fission and fusion energy. For advanced reactors, there is a demand for materials with outstanding structural properties that are maintained under long-term service in extreme conditions, such as high temperatures, and intense neutron radiation. In addition to radiation damage, neutron irradiation leads to the transmutation of H and He gases. As He is insoluble in steels, He bubbles are formed during intense irradiation which causes swelling and potentially He embrittlement. Nanostructured ferritic alloys (NFA) have been developed as potential candidate materials for use in these types of extreme conditions. Ultrafine grained NFAs contain high number densities of nanoclusters, dislocations, and grain boundaries that are preferential sites for trapping He. A comparison has been performed between high dose, He-irradiated, 14YWT NFA and a conventional F82H ferritic alloy. Transmission electron microscopy and atom probe tomography were used to detect and estimate the size distributions of the He bubbles and the He in solution in the ferrite after different doses and temperatures. These results provide information on the effectiveness of the different trapping sites in the microstructure.

### Biography

B Mazumder obtained her PhD in Physics from the University of Rouen, France. Currently she is a postdoctoral research associate in Center for Nanophase Materials Sciences at Oak Ridge National Laboratory. Her current research focuses on understanding the behavior of nanostructured ferritic alloys under extreme conditions (high temperature, high mechanical, stress, radiation damage etc) for advanced nuclear reactors. Her main expertise is based on microscopy techniques such as atom probe tomography and transmission electron microscopy. She has extensive experience in analyzing semiconductor, dielectric and oxide materials for microelectronics application.

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