

<b><u>Research field:</u></b>	Solid state physics, surfaces and interfaces / Solid state physics, chemistry and nanosciences Materials and applications / Engineering science
<b><u>Title:</u></b>	Effect of irradiation and radiolysis on the corrosion rates and mechanisms of zirconium based alloys
<b><u>Abstract:</u></b>	<p>The corrosion of zirconium based alloys is one of the limiting factors of the in-pile lifetime of the fuel rods. To optimize and enhance that lifetime of the cladding tubes, new zirconium based alloys have been designed and developed by the nuclear industries. However, the corrosion mechanisms of the old and new materials are not yet completely understood because of the complexity of the alloys and of the operating conditions (medium, irradiation?). For many years, studies have been carried out on non-irradiated materials in the Department of Nuclear Materials (CEA Saclay).</p> <p>The subject of this PhD deals with the effect of the radiolysis and of the defects induced by irradiation of the matrix and of the oxide layer on the corrosion rates of the zirconium alloys (irradiation with electrons, protons, zirconium, xenon?). Our aim is to quantify the corrosion rate dependencies with the damage proportion of the matrix and the oxide layer and the concentrations of the radiolytic species.</p> <p>The scientific direction of this PhD will be ensured by K. Wolsky and M. Pijolat of the Ecole des Mines de St Etienne. This work will be carried out in the Department of Nuclear Materials teams specialized in corrosion (M. Tupin, SEMI) and irradiation (P. Trocellier, SRMP) having the experimental means required for these investigations : irradiation platform JANNUS (Saclay and Orsay), electron accelerator of the Laboratoire de Radiolyse of the CEA Saclay, autoclaves and SOLEIL synchrotron. CEA supervisor : M. Tupin (marc.tupin@cea.fr).</p>
<b><u>Location:</u></b>	Département des Matériaux pour le Nucléaire Service d'Etudes des Matériaux Irradiés Laboratoire de Microscopie et d'Etudes de l'Endommagement Starting date: 01/10/2010 Centre : Saclay
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