

Influence of freezing rate and temperature on the hydruration of zircaloy-4.

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Abstract : The diffusion of hydrogen in zircaloy-4 'Zry-4' generates the formation of hydrides, which may lead to dangerous embrittlement of the material. Thus, the uncontrolled nucleation and growth of these phases (hydrides) can bring the formation of severe cracks of considerable sizes which may lead to catastrophic ruptures. The aim of this work is to study the nature of the microstructure obtained during an artificial loading by hydrogen of Zry-4 plates. The main variables of study of the material's behavior in a hydrogenated environment are; the temperature, dwelling time and the cooling rate. The results obtained are very encouraging because they allowed us to identify the conditions of treatments, which would prevent the formation and propagation of cracks, preventing thus catastrophic ruptures and ultimately nuclear accidents.

Keywords : Zircaloy-4, Hydrides, Artificial loading, Hydrogen, Cooling rate