In-Situ Raman Characterization of Stainless Steel in $MgCl_2$ Rich Brine

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Stainless Steel (SS) is used as the container material for the dry cask storage of spent nuclear fuel. At near-marine environments, and long-term exposure, sea-salt aerosols can adhere to the surface of the SS container and deliquesce to form Cl^- rich brines. Under such conditions, SS, typically corrosion resistant, is known to readily pit; increasing susceptibility for stress corrosion cracking (SCC). Pitting, a function of the anodic current demand and available cathodic current is dependent on the exposure conditions. In concentrated Mg-bearing brines, stable Mg precipitates tend to form which can effectively block cathodic reduction sites. *In-situ* Raman during cathodic polarization of SS (Fig.1) in $MgCl_{2(aq)}$ solutions has identified the precipitation of Mg-OH solids in the catholyte which may inhibit the corrosion process and reduce susceptibility for SCC to occur.

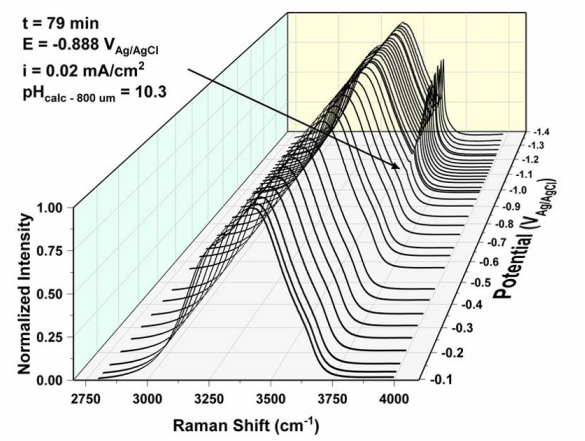

Figure 1. In-situ Raman of SS under cathodic polarization in $MgCl_{2(aq)}$.

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