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Corrosion Dynamics of Carbon Steel in the Used Fuel Container

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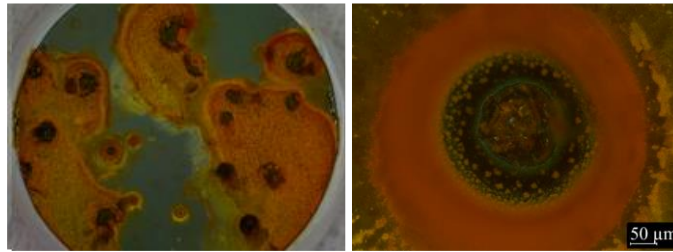
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Canada's plan for permanent disposal of used nuclear fuel involves encasement in a copper coated carbon steel (CS) container placed in a deep geological repository. Moisture trapped in the sealed container could cause internal corrosion and possible vessel failure. Therefore, an accurate understanding of CS corrosion is required for safe and permanent disposal of used fuel. Our recent studies have shown that CS corrosion progresses through different kinetic stages and strong systemic feedback between different elementary processes can be established. The formation of metal oxides in circular wave patterns is due to feedback loops between interfacial charge transfer, solution reaction and transport steps. Corrosion tests in a simulated container environment followed by post test analysis are used to study this phenomenon. The results from this work will be used to develop CS corrosion model that can accurately predict the long-term corrosion behavior CS vessel.



Oxide waves formed on CS coupons