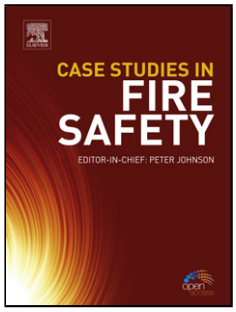

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Kinetics of hydrogen permeation through a Ni-base alloy membrane exposed to primary medium of pressurized water reactors

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Highlights

- In situ hydrogen permeation measurement through Ni-base alloy in PWR primary medium
- Hydrogen uptake kinetic modelling correlated with oxide scale growth
- High surface hydrogen activities associated with initial oxidation stage
- Hydrogen participation to stress corrosion cracking mechanisms suggested

Abstract

Hydrogen permeation kinetics through a Ni-base alloy exposed to simulated pressurized water reactors primary medium at 325 °C has been investigated. *In situ* measurements exhibit a strong decrease of H flux during the first 50 h of exposure; it has been related to the oxide scale growth at the alloy surface. A kinetic model has been proposed to describe this link. Comparing modelling and experimental results indicates that high H transient activities are generated at the alloy surface during the first hours of oxide scale growth, suggesting that H could play a role in stress corrosion cracking of Ni-base alloys.