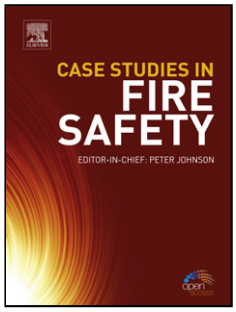

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Strain-induced Reactivation of Corrosion Pits in Austenitic Stainless Steel

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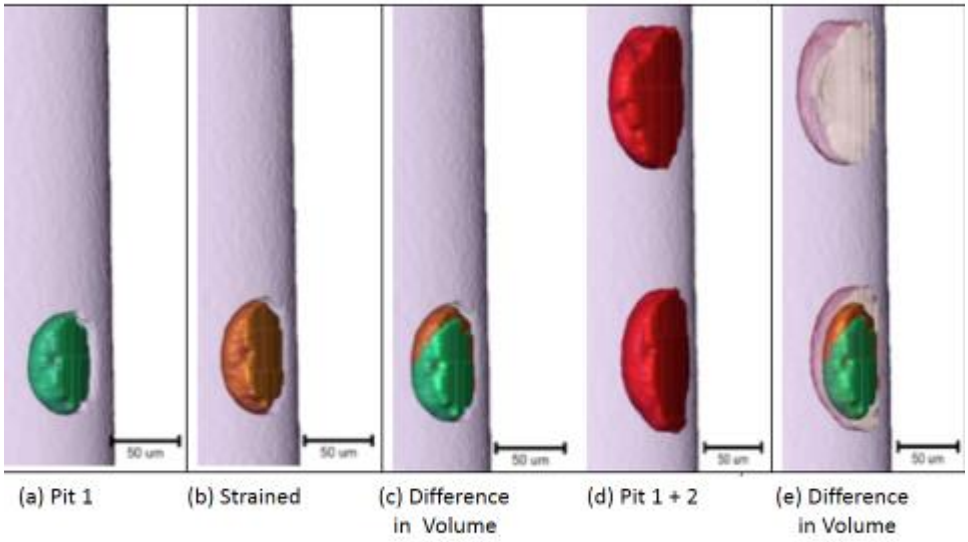
Graphical abstract



Highlights

- Strain-induced reactivation of a corrosion pit was observed, in-situ.
- Pit stability products and 3D pit growth kinetics were estimated.
- Applied strain resulted in diffusivity parameter ($D_{eff}\Delta C$) of $4.5\text{x}10^{-8}$ mol.cm^{-1}.s^{-1}
- Lacy metal cover fractures were observed.

Abstract

The reactivation of a corrosion pit under the synergetic effect of strain and electro-chemical polarisation has been observed in a type 304L stainless steel using X-ray computed tomography. The pit reactivation process was associated with the formation of a new pit, directly adjacent to a pre-existing pit. Pit growth kinetics were estimated, revealing an increase of the diffusivity parameter ($D_{\text{eff}}\Delta C$) from $3.0\text{x}10^{-8}$ mol.cm^{-1}.s^{-1} to $4.5\text{x}10^{-8}$ mol.cm^{-1}.s^{-1} with the application of strain, indicating higher metal dissolution rates. Applied strain resulted in fractured lacy metal covers, and its effect on pit growth kinetics is discussed.