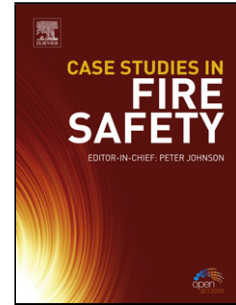


Accepted Manuscript

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PII: S0010-938X(16)30992-1
DOI: <http://dx.doi.org/doi:10.1016/j.corsci.2017.05.023>
Reference: CS 7099

To appear in:

Received date: 20-10-2016
Revised date: 17-5-2017
Accepted date: 24-5-2017

Please cite this article as: F.A.Almuaili, S.A.McDonald, P.J.Withers, A.B.Cook, D.L.Engelberg, Strain-induced Reactivation of Corrosion Pits in Austenitic Stainless Steel, Corrosion Science <http://dx.doi.org/10.1016/j.corsci.2017.05.023>

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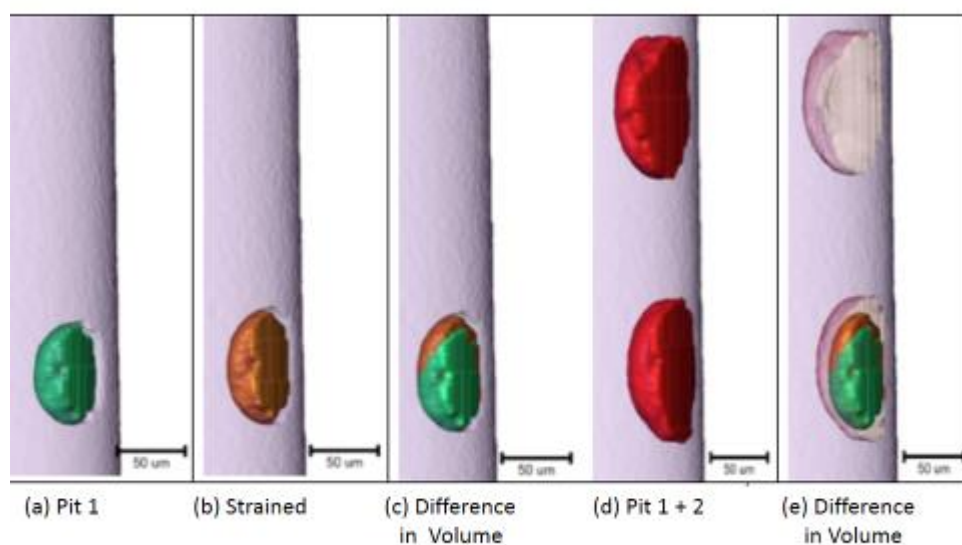
Strain-induced Reactivation of Corrosion Pits in Austenitic Stainless Steel

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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 $4.5 \times 10^{-8} \text{ mol.cm}^{-1}.\text{s}^{-1}$
- 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 ($D_{eff}\Delta C$) from $3.0 \times 10^{-8} \text{ mol.cm}^{-1}.\text{s}^{-1}$ to $4.5 \times 10^{-8} \text{ mol.cm}^{-1}.\text{s}^{-1}$ 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.

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