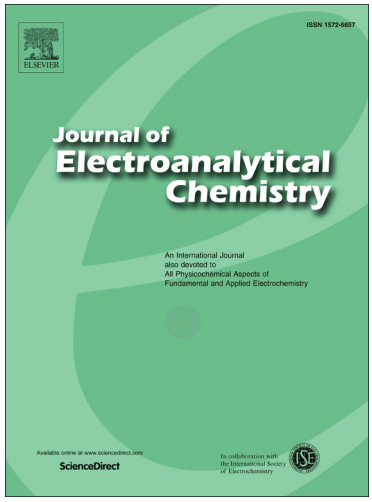

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PII: S1572-6657(15)00173-3
DOI: http://dx.doi.org/10.1016/j.jelechem.2015.04.008
Reference: JEAC 2073

To appear in: *Journal of Electroanalytical Chemistry*

Received Date: 29 January 2015
Revised Date: 1 April 2015
Accepted Date: 7 April 2015

Please cite this article as: S. Munktell, L. Nyholm, F. Björefors, Towards high throughput corrosion screening using arrays of bipolar electrodes, *Journal of Electroanalytical Chemistry* (2015), doi: http://dx.doi.org/10.1016/j.jelechem.2015.04.008

Towards high throughput corrosion screening using arrays of bipolar electrodes

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Abstract

In this work we demonstrate the possibility of combining bipolar electrochemistry with arrays of samples as a fast and versatile method for comparing their corrosion resistances at a wide range of potentials. Several steel samples of different grades were arranged in a bipolar electrochemical cell and exposed to an electric field by applying a constant current. The gradient in electrochemical potential difference across each sample resulted in a pitting corrosion gradient on the anodic parts which was used as a simple, straightforward and qualitative method of screening the corrosion properties of several samples in one single experiment. In the cell, all samples acted as individual bipolar electrodes but interestingly, the current density for each sample was also found to be influenced by the corrosion resistances of its neighbours. Results from the bipolar array were also compared with standard polarisation curves and the pitting resistance equivalent number (PREN) for each steel type.

Keywords: bipolar electrochemistry, corrosion screening, pitting corrosion, surface gradients, stainless steel