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**Determination of shift in electrodic reaction rates due to the presence of stress**[1] SWARNAVO SARKAR, Cornell University, USA, WILKINS AQUINO, Duke University, USA — An extension of Butler-Volmer formulation is proposed to determine the stress-induced changes in electrodic reaction rates. Gibbs-Duhem equation is used to determine the stress-dependent chemical potential and the corresponding change in the reaction rate. The scope of possible amplification or reduction in the reaction rates due to tensile and compressive stress fields is explored numerically. Though quantitative experimental validation remains to be pursued, behavioral agreement of the extended Butler-Volmer model with some observations made in the field of corrosive dissolution is established. Our numerical results also indicate that in addition to altering the speed of a reaction, a stress field can modify the shape of an anodic dissolution front. The effect of stress-generated surface patterns is also considered. It is well-established that a stress field can create surface patterns due to surface wrinkling or surface diffusion. We determine the possible significance of such patterns on the reaction rate, and identify the factors that may enhance their contribution to electrodic reaction rates.

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