Electrochemical Behaviour of Hafnium in Anhydrous *n*-butanol Containing Tetraethylammonium Bromide

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The electrochemical behavior of hafnium in Et₄NBr anhydrous *n*-butanol solutions were investigated using electrochemical measurements, ICP-AES and SEM techniques. Results revealed that the open circuit potential gets more positive owing to the increased passivity of a barrier HfO₂ layer with increasing immersion time until a steady state value is reached. Cyclic voltammetry did not present an anodic active dissolution section near corrosion potential as a result of the formation of the oxide layer, which was followed with severe pitting corrosion. SEM images confirmed the existence of pits on the electrode surface. ICP-AES method of chemical analysis demonstrated that the rate of pitting corrosion of Hf increased with increasing applied anodic potential. The pitting potential (E_{pit}) and the repassivation potential (E_p) can be determined jointly by cyclic voltammetry and galvanostatic measurements. E_{pit} increased with boosting potential scanning rate but decreased with enhancing solution temperature. The incubation time was necessary for pit growth. The impedance spectra showed two time constants at various potentials applied, and the passive layer resistance declined with an increase in potential.

Keywords: Hafnium; anhydrous *n*-butanol; Electrochemical; Cyclic voltammetry; electrochemical impedance spectra; Pitting corrosion

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