



Effect of Tungsten Anodization Conditions on the Photoelectrical Degradation of Orange II

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Abstract: Orange II degradation was performed on anodized tungsten wire, the effect of the tungsten anodizing conditions on the degradation performance was studied. Significant anodizing variables were considered such as anodizing voltage, anodizing time, electrolyte solution temperature and electrolyte $\text{NH}_4\text{HF}_2/\text{H}_2\text{O}$ ratio (% weight). A comprehensive Box-Behnken n factors response surfaces experimental design was proposed. The experimental results indicated that the combined effect of the experimental variables Voltage, $\text{NH}_4\text{HF}_2/\text{H}_2\text{O}$ ratio when paired with temperature are the ones with the highest impact on the Orange II degradation reaction, meanwhile the factor with the lowest impact on the Orange II degradation reaction is the anodizing time. In order to have a better understanding of the impact of the factors, statistical semi phenomenological models of the Orange II degradation results were obtained, the mathematical expressions of the models properly described the degradation of Orange II at 20 and 30 °C, however failed to adjust the data at 40 °C, where the combination of high voltage and high electrolyte $\text{NH}_4\text{HF}_2/\text{H}_2\text{O}$ ratio led to the mechanical failure of the anodizes tungsten wires.

Keywords : Orange II degradation, Tungsten anodizing.