

## Characteristic of Ta Alloy Coating Films on Near-Net Shape with Different Current Densities Using MARC Process

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**Abstract :** The harsh atmosphere of the sulfur-iodine process used for producing hydrogen requires better corrosion resistance and mechanical properties that is possible to obtain with pure tantalum. Ta-W alloy is superior to pure tantalum but is difficult to alloy due to its high melting temperature. In this study, substrates of near-net shape (Swagelok® tube ISSG8UT4) were coated with Ta-W using the multi-anode reactive alloy coating (MARC) process in molten salt (LiF-NaF-K<sub>2</sub>TaF<sub>7</sub>) at different current densities (1, 2 and 4mA/cm<sup>2</sup>). Ta-4W coating films of uniform coating thicknesses, without any entrapped salt, were successfully deposited on Swagelok tube by electrodeposition at 1 mA/cm<sup>2</sup>. The resulting coated film with a corrosion rate of less than 0.011 mm/year was attained in hydriodic acid at 160°C, and hardness up to 12.9 % stronger than pure tantalum coated film. The alloy coating films also contributed to significant enhancement of corrosion resistance.

**Keywords :** tantalum, tantalum alloy, tungsten alloy, electroplating

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