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PROJECT TITLE

Electrodeposition of Wear Resistant Films of Refractory Metals from Room Temperature Ionic Liquids

ABSTRACT (DO NOT EXCEED 250 WORDS)

The proposed research aims to study the electrodeposition process of tantalum and tungsten in room and low temperature ionic liquids such as 1-Butyl-1-methylpyrrolidinium bis(trifluoromethanesulfonyl)imide, or [BMP][Tf$_2$N]. The studies will include Raman spectroscopic and electrochemical characterization of the complex metal fluoride species in the ionic liquid before, during, and after the electrodeposition process. The choices of these metals are based on their resistance to mechanical wear and chemical corrosion as thin films and the use of tungsten in the electronics industry and tantalum coatings for medical implants. In this respect, electrodeposition is much more versatile and cost effective than chemical or physical vapor deposition. Preliminary results have shown that tantalum can be deposited from the [BMP][Tf$_2$N] ionic liquid. The overarching goal is to develop a fundamental understanding of the low temperature method for the electrodeposition of coherent deposits of the refractory metals tantalum and tungsten.