190e Sonication and Electrodeposition of Rhodium: Effects on Plating Efficiency and Surface Morphology

Michael D. Hatton Jr., Dr. Stephanie Farrell, and Dr. Robert Hesketh

Rhodium is used in the jewelry industry to brighten base metals and make jewelry more corrosion resistant. A thin layer is electroplated over less expensive base metals, such as platinum, white gold, or silver, shielding the less resistant metal from the elements. One downfall to this process is a very low efficiency resulting in higher energy costs. Rhodium electroplating is usually 8-12% efficient, with much of the energy used in side reactions that produce hydrogen and oxygen. An attempt has been made to raise the efficiency and alter the grain structure by introducing the electrodes to ultrasonic waves while electroplating. A 750 Watt, 20 kHz ultrasonic processor is used to transmit ultrasonic waves to the rhodium plating solution through a sonic horn. The pressure waves then produce cavitations and mixing in the solution. The observed effects of the ultrasonic waves on the process are altered surface morphology and up to 75% plating efficiency.