Electrodeposition of Refractory Metals from Molten Salts

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The electrodeposition of refractory metals from molten salt has been demonstrated as viable fabrication tool for commercial application. A number of special eguipment for electrolysis of the molten salts under inert atmosphere has been designed and built at Engelgard-CLAL's Carteret facility. The necessary process control provides stable and reproducible properties of the electrodeposited metals. Electroforming techniques have been developed to produce near net shape components from iridium, rhenium, niobium, platinum-iridium and tungsten-rhenium alloys. The structure and properties of the electroformed metals and alloys have been studied. Electrofroming in molten salts allows the manufacturing of items with high uniformity and tight tolerances. Coatings of iridium and rhenium on graphite and carbon-carbon composites, iridium on rhenium and molybdenum- rhenium alloys were obtained by molten salt electrolysis. Dense non- porous, crack free coatings provide an effective protection of high temperature erosion and oxidation. Various examples of the electroformed products and coatings will be presented.