

ABSTRACT:

This paper describes the application of electroforming in the synthesis of nanocrystalline nickel by very high speed movement of the electrolyte; the principles and mechanisms of electroforming in the production of nanocrystalline structured metallic objects in combination with high speed movement of electrolyte are also described. Nanocrystalline nickel components were formed at a speed exceeding 600 μm per hour; the grain size of the electrodeposited nickel was considerably reduced by high speed movement of the plating solution. When requirements specify high-tolerances, complexity, lightweight and miniature geometry, electroforming is a serious contender and in certain cases may be the only economically viable manufacturing process. AFM characterisation showed that the crystalline/particle sizes of the electroformed objects were less than 30 nm. The nickel deposits were characterised further using SEM/EDAX. The focus of this study is primarily in the application of nanomaterials in industrial gas turbines.