

METHOD OF MAKING A NANOSTRUCTURE AND NANOSTRUCTURED ARTICLES

ABSTRACT

A method of making a nanostructure and nanostructured articles by depositing a layer to a major surface of a substrate by plasma chemical vapor deposition from a gaseous mixture while substantially simultaneously etching the surface with a reactive species. The method includes providing a substrate; mixing a first gaseous species capable of depositing a layer onto the substrate when formed into a plasma, with a second gaseous species capable of etching the substrate when formed into a plasma, thereby forming a gaseous mixture; forming the gaseous mixture into a plasma; and exposing a surface of the substrate to the plasma, wherein the surface is etched and a layer is deposited on at least a portion of the etched surface substantially simultaneously, thereby forming the nanostructure. The substrate can be a (co)polymeric material, an inorganic material, an alloy, a solid solution, or a combination thereof. The deposited layer can include the reaction product of plasma chemical vapor deposition using a reactant gas comprising a compound selected from the group consisting of organosilicon compounds, metal alkyl compounds, metal isopropoxide compounds, metal acetylacetonate compounds, metal halide compounds, and combinations thereof. Nanostructures of high aspect ratio and optionally with random dimensions in at least one dimension and preferably in three orthogonal dimensions can be prepared.

Fig. 1b