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Synthesis of nanoribbons by hysycvi

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Abstract

The Novel route for in situ synthesis of nanopowders via the hybrid precursor system chemical vapor deposition (HYSYCVD) has been successfully applied in an infiltration configuration system (HYSYCVI) for the synthesis of Si_3N_4 nano-ribbons. The route is based on the thermal dissociation of a solid precursor with the subsequent reactions in gas phase, using SiC/Si porous preforms. Optimal conditions for selectively promoting the synthesis of nano-size ribbons of Si_3N_4 are outlined.

Key words: *Synthesis, Nano-ribbens, Themal dissociatiom, Sic/Si porous, Si_3N_4*

1. Introduction

The recent boom undergone by nano-science and nanotechnology has stimulated the development of a large number of processing routes for a variety of materials, ranging from metals and intermetallics to ceramics and composites. However, the routes are grouped into six widely known methods to produce nanomaterials other than by direct atom manipulation, namely, sol-gel synthesis, ball milling, electrodeposition, plasma arcing and chemical vapor deposition (CVD). The use of natural nanoparticles is also considered to be included within the 6 methods (Wilson *et al*., 2002). Other forms of classification include chemical synthesis routes, sputtering, thermal evaporation and laser methods (Edelstein and Cammarata, 1996). Liquid phase chemistry methods are considered apart because they can be used to prepare the precursor, which is subsequently converted to nanoscale particles by non-liquid phase chemical reactions.

The chemical vapor deposition (CVD) route has for a long time been considered highly attractive for several reasons, but it stands out due to the high purity of the final products. In CVD a material is heated to form a gas and then allowed to deposit as a solid on a surface, usually under vacuum. There may be direct deposition or deposition by chemical reaction to form a new product which differs from the material volatilized (Park, 2001). Other factors that should be taken into consideration are connected to the particular variant of the CVD process, especially because during the last decade, many modifications have proliferated. When assessing the viability of a new CVD route it is always important to consider the various processing parameters mentioned above, as well as availability, environmental and safety aspects of gas precursors. This is in addition to cost. As for environmental and safety issues, the use of stable solid precursors functioning as stores for the generation of other

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