

다공질 그래파이트내부로 Si 증발입자 확산에 의해 형성되는 SiC 복합재료

SiC composite formed by Si vapor diffusion into porous graphite

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Abstract : SiC thin films made by vapor silicon infiltration into porous graphite can be obtained for shorter time than liquid silicon. Si diffusion coefficient is estimated by comparing experiment results with quadratic equation obtained by Fick's second law.

1. Introduction

SiC composites have been used as the material for many thermal application products because SiC materials have high durability and thermal stability. Up to now, few papers have been reported on the fabrication of SiC composites obtained by Si-vapor reactive infiltration.

2. Experiment

SiC materials can be used on the surface and holes of graphite for avoiding particles emitted from porous graphite. Thermal CVD method is widely used to manufacture SiC thin films but high cost of machine investment and production are required. SiC thin films manufactured by Si reaction liquid and vapore with carbon are effective because of low cost of machine investment and production. SiC thin films made by vapor silicon infiltration into porous graphite can be obtained for shorter time than liquid silicon. Si materials are evaporated in about 10^{-2} torr and high temperature. Si materials are melted in 1410°C. Si vapor is infiltrated into the surface hole of porous graphite and Si_xC_y compound is formed. Si_x component is proportional to the Si vapor concentration.

3. Conclusion

Si diffusion coefficient is estimated from quadratic equation obtained by Fick's second law. The steady stae is assumed. Si concentration variation for the depth from graphite surface is fitted to quadratic equation. Diffusion coefficient of Si vapor is estimated at about $10^{-8} \text{cm}^2 \text{s}^{-1}$. This paper is supported by KISTI - ReSEAT Program.

Reference

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