

# Multiphase field modeling chemical vapor infiltration

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The chemical vapor infiltration (CVI) is an industrially widely used process to produce the SiC matrix composites reinforced by SiC fibers in ceramic engineer. To reproduce the complicated microstructure evolution during this process, a multiphase field model is formulated. The model consists of a set of nonlinear partial differential equations by coupling Ginzburg-Landau type phase field equations with mass balance diffusion equation and Navier-Stokes fluid field equation. Mathematically, the co-deposition of SiC, Si and C from methyltrichlorosilane(MTS) during CVI process is a typical free boundary problem. When this problem is handled by multiphase field method, it's greatly facilitated because of the implicitly boundary-tracking technique by phase field order parameters. This typical multiphysic field problem is solved by continuous finite element method with software COMSOL. The numerical result shows good agreement with experimental investigation.

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