SiC, Another Diamond Synthesis

Shigeto R. Nishitani, Tadaaki Kaneko and Noboru Ohtani

Silicon carbide (*SiC*) is a key material in the attempt to cut CO_2 emission. When we replace *Si* with *SiC* as the material used in high-power inverter devices, the cut-off will be equivalent with two nuclear power plants in Japan. Although this material has been expected since 1950's, the bottle neck of the replacement of *Si* with *SiC* is the high costs of its wafer production.

The authors have very recently reported a simple method that enables the epitaxial growth of *SiC* from the liquid phase at relatively low temperatures with a reasonably high growth rate. The driving force of the new process is the metastability of 3C-*SiC*, which is explained by the double-phase diagram of the *Si*-*C* system. The double-phase diagram is commonly used in metallurgy to illustrate the *Fe*-*C* system and systems including metastable phases.

The origin of the driving force of new process is the same as those of the long-known phenomenon of Ostwald ripening, and the production of synthetic diamonds developed by General Electric. In this presentation, we will also show the experimental results of *SiC* growth, and the first principles calculations of the phase stabilities of polytypes of *SiC*.