P/A/I/Nano seminar, Literature Talk
FW300, 16:00, Feb. 24 (Tue.), 2009

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Investigation of CeNi for catalytic synthesis of diamond in liquid phase

Since the 1st success of diamond synthesis using a transitional metal solvent-catalyst under the high-pressure and high-temperature (HPHT) condition in 1955, many researches were conducted to find the feasible ways of lowering pressures and temperatures for growing diamond. Later on, low-pressure chemical vapor deposition (CVD) was developed to deposit diamond films from the gas phase by the dissociation of hydrocarbon species in the presence of hydrogen atoms. The diamond crystals were shown to form inside the molten of the transitional metal alloy and solid carbon source, if H effectively diffused into the molten. The diamond crystals precipitating from the transition-$Me_xC_yH_z$ molten by low-pressure solid-state carbon source (LPSSS) process was also revealed to be achievable under H environment around 1 ATM.

Therefore, the melting point and high atomic H solubility of the metals and their alloys catalysts play key roles in the diamond growth in liquid phase at low pressure. Since CeNi was demonstrated to have a good capability of hydrogenation and a low melting point around 680 °C, CeNi prepared by Ar arc-melting is attempted to be used for catalytic synthesis of diamond growth in liquid phase under hydrogen environment around 1 ATM.

References:

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