Low-temperature growth of MgB$_2$ films by HPCVD

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We have fabricated highly c-axis oriented MgB$_2$ films on Al$_2$O$_3$ substrates at low temperatures (420°C~500°C) by hybrid physical-chemical vapor deposition (HPCVD). Crystallographic investigation of the films was performed by X-ray diffractometer (XRD) and scanning electron microscope (SEM). Their grain size and the shape of the grain were affected by the growth temperature, which had influence on the superconducting properties, such as superconducting transition temperature, critical current density, and upper critical fields. The technique of low-temperature fabrication of MgB$_2$ films is an important for the MgB$_2$ coated conductor, because the low-temperature growth has merits in industry and for technological applications of superconductivity.

Keywords: MgB$_2$ film, HPCVD, Low temperature