Single Crystal Like MgB_2 Thin Film Grown by HPCVD

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We have grown single crystal like MgB_2 thin film by hybrid physical-chemical vapor deposition (HPCVD) technique. The micro structures of single crystal quality of MgB_2 thin film were observed transmission electron microscopy (TEM). TEM specimens were prepared of in-plane view and cross section by *in-situ* lift-out technique for focused ion beam (FIB). The crystallinity of MgB_2 thin film was investigated by selected area electron diffraction pattern (SAED) and two beam method. SAED pattern of the cross section shows the MgB_2 thin film without secondary phase. The MgB_2 thin film was not observed grain boundary that was confirmed by two beam bright filed images using TEM. As a function of temperature, the magnetization curve of MgB_2 thin film is similar to that observed for single crystal MgB_2. The field dependence of magnetization for MgB_2 thin film was shown very weak pinning behavior similar to that of MgB_2 single crystal. [Phys. Rev. B **65**, 100510 (2002)].