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Effect of carbon doping on pinning force in MgB2 films QI LI, JUN CHEN, V. FERRANDO, P. ORGIANI, A. POGREBNIAKOV, YI CUI, X. XI, J. REDWING, Pennsylvania State University, PENNSYLVANIA STATE UNIVERSITY TEAM — MgB_2 thin films were doped with carbon by adding carbon containing bis(cyclopentadienyl) magnesium to the carrier gas during the hybrid physical-chemical vapor deposition process. The superconducting properties were studied by transport and magnetization measurements. It was observed that the carbon doping greatly increased upper critical field Hc2 and the irreversibility field Hirr, and significantly improved the magnetic field dependence of critical current Jc. For example, Jc in carbon doped films could reach $3\times10^5 A/cm^2$ at 5T and 4.2K when the field was applied perpendicular the film plane, while Jc in the undoped film was already diminished at 5T of field. This indicated that extra stronger pinning centers were introduced into the samples by carbon doping. Analysis of the pinning scaling law indicated that the extra pinning mechanism could be normal core pinning and large precipitates pinning depending on the doping level. The effect of carbon doping on the flux dynamics will also be discussed.

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