

Abstract Submitted  
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**Upper critical field study of CH<sub>4</sub> HPCVD carbon-doped MgB<sub>2</sub>**

F. HUNTE, J. JAROSZYNSKI, A. GUREVICH, D.C. LARBALESTIER, NHMFL-Florida State University, Y. ZHU, P.M. VOYLES, University of Wisconsin, Madison, X.X. XI, K. CHEN, The Pennsylvania State University, S. BAILY, F. BALAKIREV, NHMFL-Los Alamos National Laboratory, C.G. ZHUANG, S. MENG, C. Y. ZHANG, Q.R. FENG, Z.Z. GAN, Peking University — The  $H_{c2}(T)$  of a set of four carbon-doped MgB<sub>2</sub> films grown on both SiC and Al<sub>2</sub>O<sub>3</sub> substrates by HPCVD from methane CH<sub>4</sub> at flow rates from 7 to 10 sccm were measured in fields up to 65T. Compared to early metalorganic C sources which generated high  $H_{c2}(0)$ , these films have much lower resistivities and higher connectivities. The curvature of  $H_{c2}(T)$  derived from low current four point magnetoresistance shows upturn at low temperatures, which is consistent with the dominance of  $\pi$ -band scattering in the theory of dirty two-gap superconductivity.  $H_{c2}^{\uparrow}(0) > 60\text{T}$  is close to the paramagnetic limit of  $\sim 66\text{T}$  for the 10 sccm film on SiC, though still a little lower than for the previously used metalorganic (C<sub>6</sub>H<sub>7</sub>)<sub>2</sub>Mg. Differences in the  $H_{c2}(T)$  behavior between films grown on the two substrates are attributed to variations in strain fields produced by the substrate coupled to the film at growth.

Frank Hunte  
NHMFL-Florida State University

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