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Accentuated lattice parameters in carbon doped MgB2 thin films with enhanced upper critical fields JONATHAN GIENCKE, University of Wisconsin - Madison, ALEXEJ POGREBNYAKOV, Penn State University, BEN SENKOWICZ, University of Wisconsin - Madison, XIAOXING XI, Penn State University, DAVID LARBALESTIER, CHANG BEOM EOM, University of Wisconsin - Madison — We report a strong correlation between the accentuation of the a- and c-lattice parameters in carbon doped MgB_2 thin films grown via HPCVD and their enhanced upper critical fields. This phenomenon is in strong contrast to the behavior seen in carbon doped single crystals, where the a-lattice parameter is depressed while the c-lattice parameter remains unchanged. This has lead us to believe that the defects leading to the enhancement of the upper critical fields differ in single crystals and thin films, and is due to the non-thermodynamic equilibrium growth environment unique to thin film processes. In addition, the presence of secondary phases present only in thin films exhibiting the enhanced critical field will be discussed. Understanding the nature of these defects is essential to controlling the superconducting properties of MgB_2.

Jonathan Giencke
University of Wisconsin - Madison

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