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**The different development of the anisotropic upper critical field in $MgB_2$ by aluminum and carbon doping** M. ANGST, S.L. BUD'KO, R.H.T WILKE, P.C. CANFIELD, Ames Laboratory USDOE and Department of Physics and Astronomy, Iowa State University, Ames, IA 50011, USA — The temperature dependence of the upper critical field, $H_{c2}$, for both field directions in partially substituted polycrystalline $MgB_2$ was determined. Whereas the suppression of $T_c$ is similar for aluminum and carbon substituted samples, $H_{c2}$ is affected by the substitution in profoundly different ways. In the case of Al substitution changes can tentatively be described by intrinsic effects (shift of the Fermi level). In the C substituted samples, $H_{c2}$ is increased drastically, and extrinsic effects (disorder) have to play a major role. The strong contrast between the two substitutions is discussed, taking into account three relevant scattering rates.

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