Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Influence of ZnO and Dy2O3 on MgB2 Bulks Fabricated by High Temperature and Pressure Reaction MIKE SUMPTION, YUAN YANG, MSE, The Ohio State University — ZnO and Dy_2O_3 have been considered as dopants for the improvement of superconducting properties in MgB_2 bulks. However, the effect of these dopants is still unclear: some studies reported these metal oxides worked as new pinning centers and others was attributed the effects to Mg site substitution. In addition, low temperature reactions may explore limited solubility regimes for these dopants. In order to study the intrinsic effect of ZnO and Dy_2O_3 in MgB_2, a high temperature solid state sintering method has been used to fabricate dense and homogeneous MgB_2 bulks. Even higher temperature excursions above the peritectic allow us to explore the solubility limits. To do this we used an induction furnace built inside of a high pressure vessel which allowed us to reach 1700°C and 1500 Psi. A slow cooling rate (2°C/min) was used in an attempt to obtain a homogeneous nucleation and phase distribution. A series of MgB_2 bulk samples with ZnO and Dy_2O_3 additives were synthesized through this high pressure and temperature procedures. The resulting microstructures of these bulk samples were revealed by SEM and TEM. Atomic substitution were evaluated by high resolution XRD. The upper critical field B_{c2}, irreversible field B_{irr} and T_c were obtained from both magnetic and resistivity measurements. The roles of substitution vs precipitate induced strain on B_{c2}enhancements with adding ZnO and Dy_2O_3 were discussed.

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Date submitted: 05 Nov 2015 Electronic form version 1.4