

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Inter- and intra-granular current properties of iron pnictide superconductors** AKIYASU YAMAMOTO, ANATOLII POLYANSKII, JIANYI JIANG, FUMITAKE KAMETANI, MARINA PUTTI, CHIARA TARANTINI, FRANK HUNTE, JAN JAROSZYNSKI, ERIC HELLSTROM, ALEX GUREVICH, DAVID LARBALESTIER , National High Magnetic Field Laboratory — The iron pnictide superconductors have very high upper critical field  $B_{c2}(0)$  of possibly over 100 T for 1111 and 50-70 T for 122. We have recently shown [1,2] that polycrystalline 1111 samples exhibit electromagnetic granular behavior, perhaps in an analogous way to that seen now to be intrinsic to the HTS cuprates. Detailed investigation is proceeding in parallel with serious efforts to make more single phase samples, since it appears that all present polycrystalline oxypnictides are multi-phase. In particular we are using magneto-optical imaging to study the local variation of current density and then performing detailed microstructural analysis by SEM, TEM and orientation analysis to understand intergranular current flow. At the present time we see that samples are multi-phase, often with a grain boundary wetting phase, but even so the global  $J_c$  attains 1000-4000 A/cm<sup>2</sup>, some 10-40 times that seen in single phase YBCO randomly oriented polycrystalline. On the other hand, very high intra-grain critical current owing to the strong pinning reminiscent of Nb-Ti is observed in the Co doped Ba122 pnictide. We will report on our latest results on the inter- and intra-granular current properties in the high- $T_c$  pnictides. [1] A. Yamamoto et al., Appl. Phys. Lett. **92**, 252501 (2008). [2] A. Yamamoto et al., Supercond. Sci. Technol. **21**, 095008 (2008).

Akiyasu Yamamoto  
National High Magnetic Field Laboratory

Date submitted: 21 Nov 2008

Electronic form version 1.4