Progress in the Development of High Performance Pnictide Wires

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***Abstract*— Iron pnictide superconductors are very attractive for applications in the high magnetic field region, because of their large upper critical field, small anisotropy, etc. However, the practical realization requires pnictide wires with high transport currents and excellent mechanical properties, which are multi-filamentary and homogeneous in long lengths, to be produced at low cost. A lot of works had been carried out to solve the problems associated with these factors. Recently, we have made further improvement in the high-field J_c of 122 type pnictide wires, which exhibited a transport critical current density value J_c as high as 5×10^4 A/cm^2 at 26 T, 4.2 K. The high density nano-scale defects formed in the superconducting core possibly account for this large in-field J_c. We also get new results for the Cu-sheathed pnictide wires. By using a low temperature sintering process, the Cu-sheathed Sr122 samples exhibit a high J_c of 3.5×10^4 A/cm^2 in 10 T and 1.6×10^4 A/cm^2 in 26 T at 4.2 K, respectively. This fascinating result indicates a promising future for Cu using as the sheath material in pnictide wires. At the same time, wires with a good mechanical property have been fabricated using Fe/Ag as composite sheath material in Sr122 wires. The composite sheath provides both inert reaction with the superconducting core and high mechanical properties of the wires. It is expected that further optimized properties in pnictide wires can be obtained based on improved manufacturing technologies.**

***Keywords (Index Terms)*– Pnictide superconductor, wires, critical current density.**

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