INTRODUCTION AND PURPOSE

Recent publications by the Applied Superconductivity Center indicate that Bi-2212 (Bi$_2$Sr$_2$Ca$_2$Cu$_3$O$_{x}$) imbedded in a AgMg outer sheath can increase its critical current density $J_c$ by a factor of 8 when put through a heat treatment (HT) and over pressure treatment (OP) with O and Ar gas. The Bi-2212 core must also undergo the heat treatment as well. Arno Godeke sent us a sample of core, Berkalloy, material that had been through the Bi-2212 HT at 1 bar pressure. We put a sample through the HT and pressure of 100 bar in 99% Ar and 1% O$_2$. We were puzzled as to why the 100 bar HT had so much more oxidation.

PROCEDURE

1. Berkalloy was cut, polished, and annealed for 24 hours in flowing oxygen at 500°C, 700°C, and 800°C, respectively.
2. The as-received and annealed samples went through a standard Bi-2212 100 bar OP-HT.
3. The metal samples were placed into a small round polymer puck which was ground down using varying grits of sand paper then placed in the VibroMet machine for approximately six hours for the final polishing.
4. Images were obtained using the Zeiss 1540 XB Scanning Electron Microscope (SEM) and the different element concentrations were determined using Electron Dispersive and X-ray spectroscopy (EDAX).

ANALYSIS CONTINUED

CONCLUSION AND FUTURE WORK

• For Berkalloy an annealing treatment of 700°C for 24 hours treatment gave us the thinnest and most uniform oxidation.

• Separation of the oxidized layer was noticed with the 700°C and 800°C samples. It was believed that the polishing process caused the layers to separate (Scaling).

• Other alloys, are also undergoing treatments to verify if they would make better cores for superconductors.

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