

Influence of the Oxygen Partial Pressure on the Phase Evolution During Bi-2212 Wire Melt Processing

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Abstract — We have studied the influence of the oxygen partial pressure pO_2 up to 5.5 bar on the phase changes that occur during melt processing of a state-of-the-art Bi-2212 multifilamentary wire. Phase changes have been monitored *in situ* by high energy synchrotron X-ray diffraction (XRD). We found that the stability of Bi-2212 phase is reduced with increasing pO_2 . For $pO_2 > 1$ bar a significant amount of Bi-2212 phase decomposes upon heating in the range 400 to 650 °C. The extent of decomposition strongly increases with increasing pO_2 , and at $pO_2 = 5.5$ bar Bi 2212 decomposes completely in the solid state. Textured Bi 2212 can be formed during solidification when pO_2 is reduced to 0.45 bar when the precursor is molten. Since the formation of current limiting second phases is very sensitive to pO_2 when it exceeds 1 bar, we recommend to reduce the oxygen partial pressure below the commonly used $pO_2 = 1$ bar, in order to increase the pO_2 margins and to make the overpressure process more robust.

Keywords (Index Terms) — Bi-2212, melt processing, XRD.