

Synthesis of Nano Sized BaCeO₃ for an Effective Flux Pinning Center in YBCO Superconductor

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To fabricate a high T_c superconductor with outstanding superconducting properties, it is important to pin the flux inside the superconductor. When these flux pinning centers are refined and uniformly distributed, the flux can be pinned efficiently enough for high magnetic field or electric power applications. It has been reported that Y₂BaCuO₅ (Y211) which is a representative flux pinning center, was refined by adding CeO₂ to the YBa₂Cu₃O_{7-x} (Y123) superconductor and BaCeO₃ has been reported as a flux pinning center which is also formed from a reaction of the added CeO₂ with Y211.

In this work, we fabricated reduced BaCeO₃ particles to improve the flux pinning effect by an attrition milling. BaCO₃ and CeO₂ were mixed using a ball milling for 24 hrs and calcined at 1200°C for 5 hrs in a box furnace by a conventional solid state reaction to form BaCeO₃ powder. The obtained BaCeO₃ powder was attrition milled with a rotation speed of 250 rpm and by changing attrition milling time (60, 120 and 240 min). The formation of the BaCeO₃ phase was examined by a X-ray Diffractometer (XRD). The microstructure and particle size were studied by using a Scanning Electron Microscope (SEM) and a Particle Size Analysis (PSA) respectively. It was observed that the particle size was reduced with an increasing attrition milling time. As a result, the nano sized BaCeO₃, fabricated by an attrition milling can be used as an effective pinning center for YBCO.

Keywords : YBCO; BaCeO₃; Flux pinning; Attrition milling; Microstructure

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