Study on the structure of HoBa$_2$Cu$_3$O$_{7-\delta}$ ceramic superconductor

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Abstract
The structural properties of HoBa$_2$Cu$_3$O$_{7-\delta}$ high Tc superconductor by XRD, SEM and EDX, resistivity, critical electrical current density and oxygen content measurement have ben studied. The sample of HoBa$_2$Cu$_3$O$_{7-\delta}$ is prepared by solid state reaction, with two different thermal conditions. The XRD results have shown the formation of pure phase of HoBa$_2$Cu$_3$O$_{7-\delta}$. The oxygen content measurement for two samples by iodometric titration gives 6.76\pm0.9 and 7.0\pm0.09. The measurement of critical current density measurement for two samples has shown that between Jc and Jco the potential versus current has exponential behavior ($V = aI^\beta$). Also measuring Jc near transition temperature gives lower critical current density than measuring it far from the transition temperature. The critical current density of the sample with lower oxygen content is lower than in other samples. The SEM results showed that by increasing the oxygen content and slow cooling, the grains growth of sample increase.