

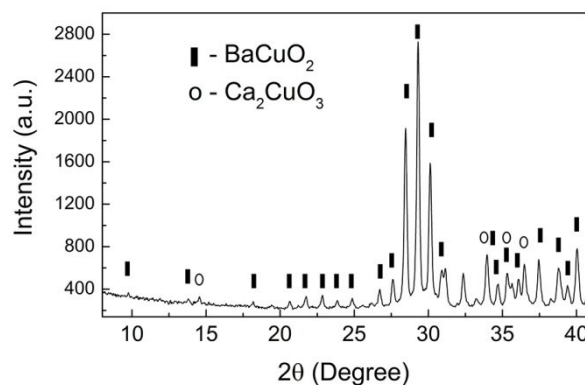
Synthesis and properties of Tl-Based superconductors

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The effect of the precursor on Tl-1223 system has been examined. Better chemical homogeneity and higher reactivity of the precursor powder were successfully obtained using modified sol-gel method. The X-ray diffraction pattern of $\text{Ba}_2\text{Ca}_2\text{Cu}_3\text{O}_y$ precursor powder, prepared by SG methods is plotted in Figure 1. The sample consists of only two phases of BaCuO_2 and Ca_2CuO_3 . The existence of BaCuO_2 and Ca_2CuO_3 phases only is



a good indicator for qualitative preparation

Figure 1. X-ray diffraction pattern of $\text{Ba}_2\text{Ca}_2\text{Cu}_3\text{O}_y$ precursor powder.

[1]. A polycrystalline sample of the $\text{TlBa}_2\text{Ca}_2\text{Cu}_3\text{O}_{8+\delta}$ superconductor was obtained via the thermal treatment of Tl-free precursor powders in the Thallium vapor environment using the sealed quartz tube technique. The diamagnetic onset temperature of the superconducting transition for sol-gel-sample was observed about $T_c \approx 123$ K and for solid-state reaction-samples $T_c \approx 115$ K. The critical current density for the SG-sample at liquid nitrogen temperature was obtained approximately 145 A/cm^2 , whereas for SSR-samples is 82 A/cm^2 . As a result, we could conclude that, the superconductors prepared by sol-gel route with an excellent physicochemical properties and high T_c .

References

- [1] I.R. Metskhvarishvili, T.E. Lobzhanidze, G.N. Dgebuadze, M.R. Metskhvarishvili, B.G. Bendeliani, V.M. Gabunia, L.T. Gugulashvili, "Sol-Ge Processing of Precursor for Synthesis of Mercury-Based Superconductors", Chapter 15 In Book: *Science and Technology of Polymers and Advanced Materials: Applied Research Methods*, Apple Academic Press, Inc. 2019, p. 389.