

The effect of PbO nanoparticles on structural and microstructure of $\text{Bi}_{2-x}\text{Pb}_x\text{Sr}_2\text{Ca}_2\text{Cu}_4\text{O}_y$ superconductor composition

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Abstract: In this paper, β -PbO nanoparticles were prepared by microwave irradiation. Then, the PbO nanoparticles with size of 32 nm were doped in the $\text{Bi}_{2-x}\text{Pb}_x\text{Sr}_2\text{Ca}_2\text{Cu}_4\text{O}_y$ superconductor with $x = 0.0, 0.2, 0.4$ and 0.6 . The samples were synthesized by the standard solid state reaction method. The structural properties, microstructure and morphology of the samples have been studied by XRD and SEM. After synthesizing the samples and observing the Meissner effect, the study of the critical current density (J_c), critical temperature (T_c) and thermogravimetry-differential thermal analysis shows that samples have been down. The results of the critical current density measurements show that the sample with $x = 0.4$ and an annealing time 60 h has the maximum J_c . Substitution of PbO nanoparticles for Bi reveal that remarkable increases in the critical temperature. The volume of the unit cell of doped samples were increased with respect to that of the undoped samples, which is shown Bi^{+3} substituted by Pb^{+2} .

Keywords: *Nanoparticles of PbO; superconductivity; critical current density; structural and microstructure.*

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