International Journal of Applied and Natural Sciences (IJANS)
ISSN(P): 2319-4014; ISSN(E): 2319-4022
Vol. 6, Issue 2, Feb - Mar 2017; 13-22

International Academy of Science, Engineering and Technology
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STUDY OF OXYGEN ISOTOPE EFFECT IN Pr, Ca, AND Zn DOPED SUPERCONDUCTIVITY $YBa_2Cu_3O_{7-\delta}$,

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ABSTRACT

The oxygen isotope effect in Pr, Ca, and Zn doped superconductivity $YBa_2Cu_3O_{7-\delta}$ was investigated. Pr and Ca substitute predominantly at the Y site while Zn goes into the Cu plane site. The shift in critical temperature (ΔT_C) between samples oxygenated in ^{18}O and ^{16}O was obtained via dc resistance measurements, and low field dc magnetization and ac susceptibility measurements in a SQUID magnetometer. Confirmation of the substitution of the oxygen was a achieved with Raman and SIMS measurements. The Pr, Ca and Zn substituted change T_C of the superconductor in different ways. Increasing Pr concentrations lower T_C and increase ΔT_C with the isotope coefficient, α, approaching $1/2$. The additions of ca reduces the size of both ΔT_c and α. Both exhibit a small parabolic effect with increasing Ca substitution. An increase in Zn substitution. An increase in Zn substituted lowers T_C but ΔT_C remains nearly constant, or perhaps gets slightly smaller, with α increasing to approximately $1/3$.

KEYWORDS: Oxygen Isotope Effect in Pr, Ca, and Zn Doped Superconductivity $YBa_2Cu_3O_{7-\delta}$