

**Faculty of Science**

**Department: Chemistry**

**Name: Khaled M. Elsabawy**

**Title: Micro-structural properties of  $Te^{4+}$ -doped  $Mg_{1-x}Te_xB_2$  superconductor regime**

**Authors: Khaled M. Elsabawy**

**Published In: Materials science An Indian J.2,6 (2006)**

**Impact Factor: 0.64**

**Abstract:**

The pure and tellurium-doped samples having formula  $Te^{4+}$ -doped  $Mg_{1-x}Te_xB_2$  (where  $x=0.0, 0.05, 0.1$  &  $0.2$  mole) were prepared via high temperature solid state reaction route. The synthesis was depending upon diffusion mechanism of both Mg- and Te-vapours through boron-matrix. The solubility limits of tellurium was found to be too tide to substitute higher than  $0.2$  mole on Mg-sites. X-ray diffraction analysis for investigated samples proved that all samples were found mainly belong to single hexagonal phase with P6/mmm symmetry with very small traces from MgO and  $TeO_2$  as secondary phases in minor. From SE-microscopy and EDX analyses only MgO was detected in between grains and no existence for any aggregations of expected  $TeO_2$  secondary phase. Magnetic susceptibility) measurements indicated that only the sample with maximum thrium doping ratio  $x= 0.2$  mole exhibited slight depression on its value of  $T_c$ -offset which found to be  $35.1K$ .

**Key words:**

Te-doping, X-ray , crystal structure, SE-microscopy;  $MgB_2$  ; supercondurtor

*Faculty of Science*

*Department: Chemistry*

*Name: Khaled M. Elsabawy*

*Title: Limitation of mercury doping and raman spectra of doped  $Mg_{1-x}Hg_xB_2$  superconductor*

*Authors: Khaled M. Elsabawy & Elsayed E. Kandyel*

*Published In: Materials chemistry and physics, 103 (2007)*

*Impact Factor: 1.65*

**Abstract:**

The undoped and mercuric-doped samples are having general formula  $Mg_{1-x}Hg_xB_2$  (where  $x= 0.0, 0.02, 0.04$  and  $0.08$  mole %) were prepared via high temperature solid state reaction route. The synthesis was depending upon diffusion mechanism of both Mg and Hg-vapour ions through boron-matrix. The solubility limits of mercury was found to be too tide to substitute higher than  $0.08$  mole % which emphasizes that dopings or substitution of  $MgB_2$  regime is too limited and needs many precautions to be chemically successful. X-ray diffraction analysis for investigated samples proved that all samples were found mainly belong to single hexagonal phase with P6/mmm symmetry with very small traces from MgO as secondary phase in minor. From SE-microscopy and EDX analyses only MgO was detected in between grains and no existence for any aggregations of expected HgO secondary phase. Magnetic susceptibility measurements indicated that only the sample with maximum mercuric doping ratio  $x=0.08$  mole % exhibited slight depression on its value of  $T_c$ -offset which found to be  $36.1$  K Raman spectrograms recorded for samples c,d those with dopant ratio  $x=0.04$  and  $0.08$  mole%, respectively, exhibited broad lines lies at  $\sim 430$  and  $550$   $cm^{-1}$  is attributable to strong electronic scattering caused by MgO secondary phase.

**Key words:**

Hg-doping, X-ray, crystal structure; Raman spectra; SE-microscopy;  $MgB_2$  superconductor

*Faculty of Science*

*Department: Chemistry*

*Name: Khaled M Elsabawy*

*Title: Oxidative degradation of eosiny dye using 2212DSCCO superconductor as surface catalyst*

*Authors: Khaled M. Elsabawy; Morsy M.A.Sekkina; A. El-Daly & M. Jansen*

*Published In: An Indian J., 2 (2007)*

*Impact Factor: 0.51*

***Abstract:***

The kinetics of oxidative degradation of Eosin Y dye on 2212-cuprat superconductor catalyst was investigated carefully in an aqueous solution in the presence of H<sub>2</sub>O<sub>2</sub>. The conditions of pseudo-first order reaction were applied. The catalyst was prepared by conventional solid state reaction technique of highly pure oxides mixture at 830 C. The structure and morphological properties of the catalyst surface were characterized by SRD, EDX & SEM respectively. Results obtained indicated that, the rate of eosin Y dye degradation was found to be pH-dependent. Furthermore, the effect of added the KCl and SDS anionic surfactant on the reaction rate were investigated and exhibited an increase in the case of KCl and decrease in case of SDS surfactant. The mechanism was proposed and the activation parameters were calculated.

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**Department: Chemistry**

**Name: Khaled M. Elsabawy**

**Title: Lead substitutions for promoted critical current density  $J_c$  and mechanical properties of  $Mg_{1-x}Pb_xB_2$  regime**

**Authors: Khaled M. Elsabawy and Elsayed E. Kandyel**

**Published In: Materials research bulletin, 42 (2007)**

**Impact Factor: 1.38**

**Abstract:**

Lead was used as softener dopant element to replace on magnesium sites in  $Mg_{1-x}Pb_xB_2$  regime (where  $x = 0.0, 0.05, 0.1$  and  $0.2$  mole). Samples were prepared via high temperature solid-state reaction technique depending upon diffusion mechanism of Mg/Pb-vapour ions through boron-matrix. The maximum solubility limit of lead in was found to be  $\sim 0.2$  mole, which emphasizes that substitution on  $MgB_2$  system is still too limited and needs many precautions to be successful. The crystalline lattice constants were evaluated and exhibit noticeable length elongation in case of c-axis as  $x$  increases while a, b-axes were nearly constant, effect of Pb-doping was investigated carefully on microstructure and superconducting properties of  $MgB_2$  system. SE-microscopic analysis indicated that lead ions diffuse regularly through surface and bulk in case of ( $x=0.05$  and  $0.1$  mole) and grain size was estimated and found in between  $0.43$  and  $1.6 \mu m$ . Critical current densities ( $J_c$ , s values) recorded a reasonable increase as Pb-content increase (from  $x=0$  to  $0.1$  mole) while recorded a slight decrease for sample with maximum lead content ( $x=0.2$  mole). The mechanical tensile strength of the samples was clearly improved linearly as Pb-content increase recording maximum tensile  $31.7$  MPa for sample with  $x=0.2$  mole.

**Key words:**

A. ceramics; B. Chemical synthesis, C. X-ray diffraction; D. electrical properties; D. mechanical properties.