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## Microstructural Properties of ZnO Powder Nanostructures Prepared by Mechanical Alloying

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**Introduction:** The wide bandgap semiconductors (ZnO) have been studied for several years in a highly competitive international environment given their wide range of applications. In our work we prepared powder nanoparticles mechanically alloyed.

**Experimental/Theoretical Study:** ZnO powder nanoparticles mechanically alloyed were doped with iron to investigate their structural and microstructural properties using X-ray diffraction (XRD), scanning electron microscopy (SEM) [1,2] and differential scanning calorimetry (DSC) for examined pure ZnO and 5% Fe doped ZnO.

**Results And Discussion:** The ZnO starting pure powder exhibited a hexagonal crystal structure with space group  $P6_3mc$  of ZnO, however with the introduction of 5%Fe in the ZnO milled powder, the hexagonal ZnO phase remained unchanged, whereas the microstructural parameters were subject to significant variations due to the introduction of Fe atoms into the ZnO hexagonal matrix to replace oxygen ones [3]. The size of crystallites and microstrains are found milling time dependent.

**Conclusion:** This product exhibited a hexagonal crystal structure with space group  $P6_3mc$  of ZnO and with *c*-axis preferential orientation, however with the introduction of 5 % Fe in the ZnO milled powder, the hexagonal ZnO phase remained unchanged, whereas the microstructural properties were subject to significant variations due to the introduction of Fe atoms into the ZnO hexagonal matrix to replace oxygen ones.

### References

- [1] B. Weintraub, Z. Zhou, Y. Li, and Y. Deng, "Solution synthesis of one-dimensional ZnO nanomaterials and their applications," *Nanoscale*, vol. 2, no. 9, pp. 1573-1587, 2010.
- [2] Look, D.C. (2006) 'Progress in ZnO materials and devices', *Journal of Electronic Materials* Vol. 35, pp. 1299-1305.
- [3] S Q. B. Ma, Z. Z. Ye, H. P. He, L.P. Zhu, J.Y. Huang, Y. Z. Zhang and B. H. Zhao, *Scripta Materialia*.vol. 58 21-24, 2008

### Biography:

S. Oudjertli has received his Magister degree in 2008, at the Department of Physics, University of Badji Mokhtar Annaba, Algeria. He has more than 04 articles and 15 international congress communications. He is preparing his Doctorat in Material Science, his research focuses on the structural, and microstructural, properties of ZnO prepared by mechanical alloying. He will support his doctoral thesis in a few days. He mainly worked in the area of nanomaterials, modelisation, materials science, amorphous alloys and magnetic properties. His current research includes simulation and characterisation of nanostructured materials, nanocomposites, and nanotubes prepared by several methods; CVD, spray pyrolysis, mechanical alloying, ion implantation.