

Transmission Electron Microscopy Study of a New Compound in the System Sm-Mn-Ge-O

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One of the most common problems in solid state chemistry is to dispose with the suitable synthesis method to generate novel materials, in the last years new methods to grow synthetic single crystals have been considerable interest [1, 2]. As an example of that we are working in the synthesis, crystal structure determination and physical properties characterization of new materials with potential optical, electric or magnetic applications. For this reason, we were in the necessity to design and build a reflective furnace obtained compounds like the laminar monoclinic compound $\text{EuMnGe}_2\text{O}_7$ [3] and recently the new single crystal in the system Sm-Mn-Ge-O.

The limitations of our reflective furnace are: 1) The single crystals obtained do not have the desirable size to do single crystal X-ray diffraction measurements, figure 1a and 1b show the crystal size and the typical morphology observed in the single crystals of the system Sm-Mn-Ge-O. 2) All the sample is not enough to do X-ray powder diffraction measurements.

Therefore this work has the aim to do the crystal structure characterization of a new compound in the system Sm-Mn-Ge-O using transmission electron microscopy (TEM) as a main tool. The subject is not a trivial task because the compound under study is totally new and we do not have any reference. Moreover the presence of several satellite dots in the electron diffraction patterns (fig. 2) complicates their indexing.

The results about the crystal structure will be useful to understand the possible optical, electric or magnetic properties of this compound. The crystal structure characterization carried out using microscopy seems to be very powerful tools when it is impossible to do it by X-ray diffraction measurements.

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- [2] Y. Suetsugu and J. Tanaka. *J. Mater. Sci. Materials in Medicine* 10 (1999) 561-566.
- [3] E. A. Juarez-Arellano, G. U. Gamboa-Espinosa, A. Lara, L. Bucio and E. Orozco. *LatinAm. J. Metall. Mater.* 21 No.2 (2001) 9-12.
- [4] Acknowledgements: P. Mexia, R. Hernandez, A. Rodriguez-Hernandez; and the project DGAPA- PAPIIT IN 113199. One of the authors (E. A. Juarez-Arellano) acknowledges the fellowship of Consejo Nacional de Ciencia y Tecnologia (CONACyT).

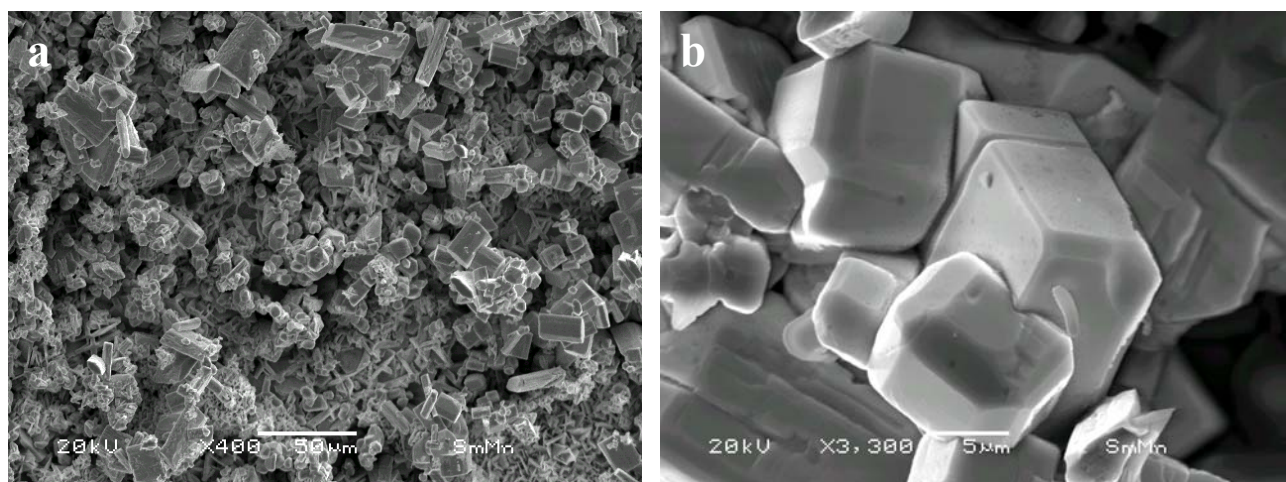


FIG. 1 a) A general view of the synthesis products. b) A view of the crystal size and the typical morphology observed in the single crystals of the system Sm-Mn-Ge-O.

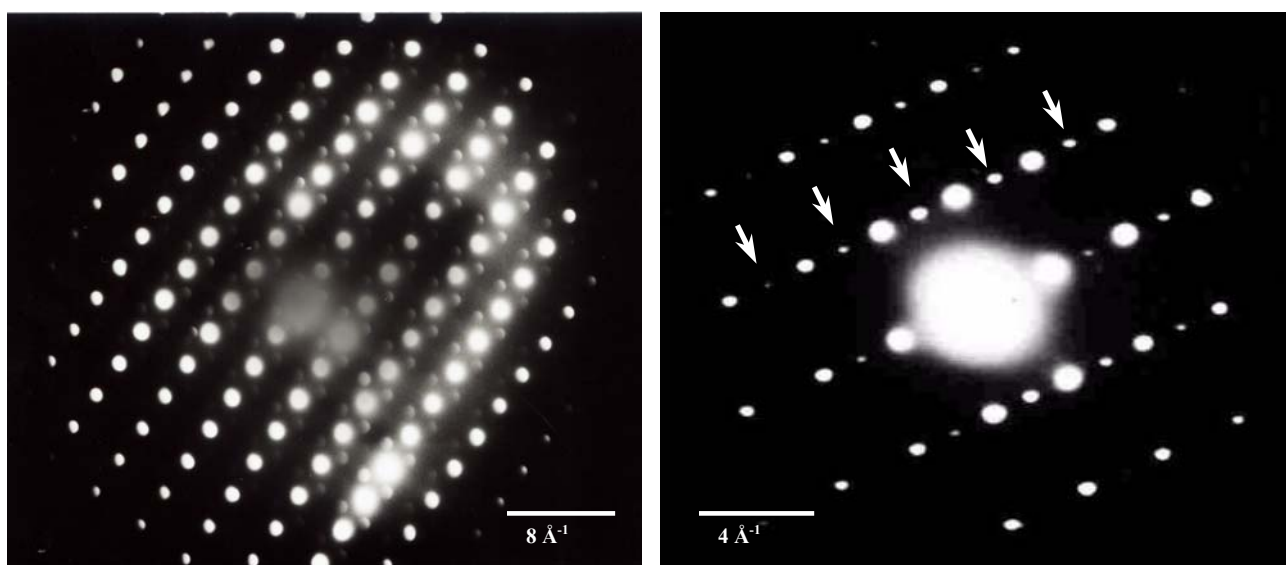


FIG. 2 Electron diffraction patterns where the presence of several satellites dots are observed (indicated by arrows).