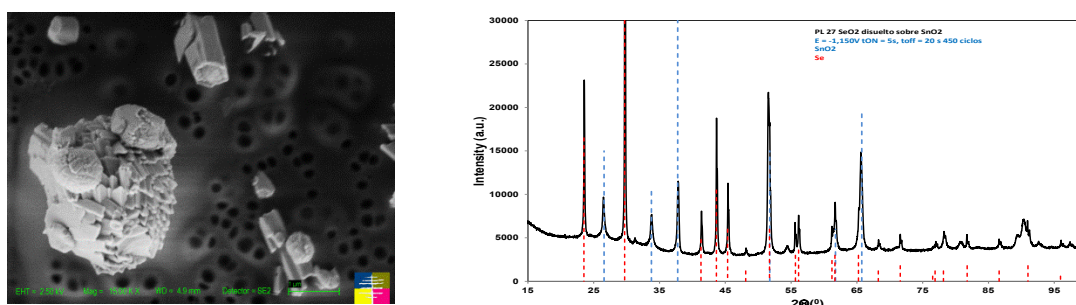
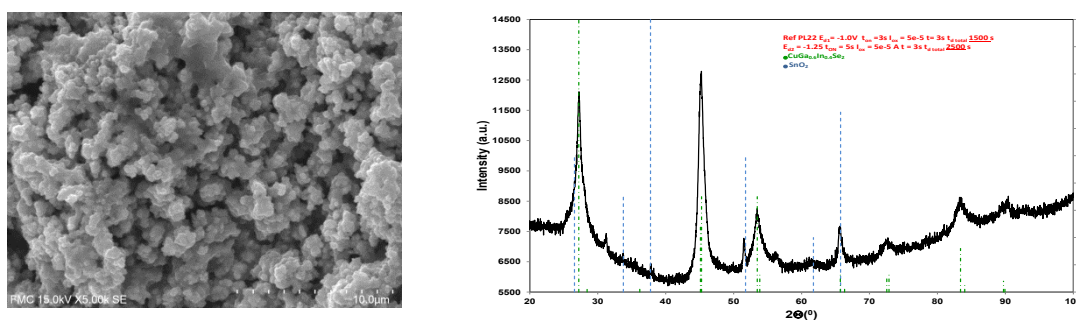


DEEP EUTECTIC SOLVENT ROUTE FOR Se AND $\text{CuGa}_x\text{In}_{1-x}\text{Se}_2$ ELECTROSYNTHESISY. Castrillejo^{1,2}, J. Gutierrez¹, E. Barrado^{1,2}¹Dpto. de Química Analítica. F. Ciencias. U. Valladolid. 47011. Valladolid. SPAIN²Institute of Sustainable Processes. Dr. Mergelina s/n 47011 Valladolid.SPAIN ycastril@qa.uva.es

Electrosynthesis appears as one of the best methods to prepare advanced materials under the form of coatings or thin layers, due to its many advantages: i) economics (e.g. low investment is required for an easy composition control, with large coverage areas and high deposition rates), and ii) ecologic (no product loss, and efficient use of raw materials). Nevertheless, aqueous electrolysis presents two important shortcomings; the low crystallinity of the electrodeposited material (due to the low working temperature) and the hydrogen discharge that hinders the electrodeposition of very electronegative elements such as Ga and In, reduces the plating efficiency, and has destructive impacts on the thin film quality causing the appearance of pinholes and dendritic morphologies. In order to prevent these drawbacks, the use of deep eutectic solvents as electrolytes could be a promising way to elaborate materials with tailored structures and properties. In this communication, the method has been successfully applied to the electrodeposition of Se and the semiconductor $\text{CuGa}_x\text{In}_{1-x}\text{Se}_2$ which is a good candidate for window layers realization in thin film solar cells.

Electrochemical investigations performed in the eutectic mixture ChCl-EG (1:2) at 343, 373 and 383 K are reported. DRXs and SEM analysis of the samples obtained under potentiostatic electrolysis indicated that: i) red and black Se were electrodeposited on Mo and glass sheets covered with SnO_2 , and ii) $\text{CuGa}_x\text{In}_{1-x}\text{Se}_2$ (with x ranging from 0.4 to 0.6) were electrodeposited on glass sheets covered with SnO_2 .

Figure 1.- SEM and DRXs of black Selenium obtained at -1.15 V in the eutectic $\text{ChCl-Eg}(1:2)$ at 343 KFigure 2.- SEM and DRXs of $\text{CuGa}_{0.6}\text{In}_{0.4}\text{Se}_2$ obtained at -1.00 V in the eutectic $\text{ChCl-Eg}(1:2)$ at 343 K**Acknowledgements**

Authors thank the Junta de Castilla y León (RIS3 de Castilla y León 2014-2020), Project CLU-2017-09 for financial support.