

256 Photodeposition of $\text{CaTiO}_{3-x}\text{-Pr}$ amorphous thin films and their evaluation as optical materials

G. Cabello¹, L. Lillo¹, C. Caro¹, M. Seguel¹, G.E. Buono-Core², B. Chornik³, C. Carrasco⁴, C.A. Rodríguez⁴

¹Depto. de Ciencias Básicas, Facultad de Ciencias, Universidad del Bio-Bio, Chile

²Intituto de Química, Pontificia Universidad Católica de Valparaíso, Chile

³Depto. de Física, Facultad de Ciencias Físicas y Matemáticas, U. de Chile

⁴Depto. de Ingeniería de Materiales, Facultad de Ingeniería, U. de Concepción, Chile

gcabello@ubiobio.cl

This work reports the characterization and optical properties of CaTiO_{3-x} thin films doped with Pr at different proportions (0-15 mol %). The films were deposited on Si(100) and quartz substrates using a photochemical method and post-annealed at 900 °C. The evaluation of photo-reactivity of the complexes precursors was monitored by UV-vis and FT-IR spectroscopy. The obtained films were characterized by X-ray diffraction and X-ray photoelectron spectroscopy.

The results indicate that Ca, Ti, O and Pr are present in the form of perovskite doped adopting a mixture of amorphous phase and another crystalline phase. Under UV light excitation (375 nm) the $\text{CaTiO}_{3-x}\text{-Pr}$ films show the characteristic emissions ascribed to $^1\text{D}_2 \rightarrow ^3\text{H}_4$ transition of Pr^{3+} ion. The optical measurements show the presence of intermediate energy levels in the band gap influences in the emission process, as shown in the Fig. 1.

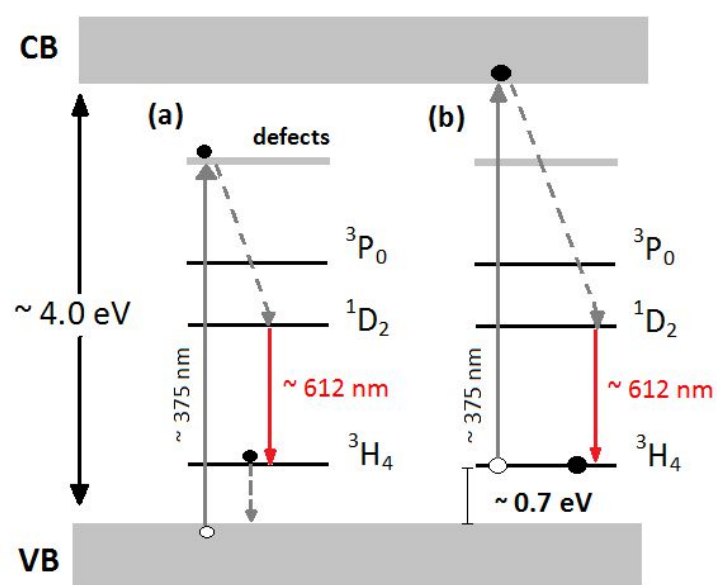


Fig. 1. Schematic illustration showing the relation between the band structure of host and the energy levels of the 4f state of Praseodymium in CaTiO_{3-x} , emission upon (a) the defects centers excitation and (b) the charge transfer excitation process.

References

- [1] G. Cabello, A. Araneda, L. Lillo, C. Caro, C. Venegas, M. Tejos, B. Chornik, *Solid State Sciences* 27 (2014) 24-29.
- [2] Y. Inaguma, T. Tsuchiya, Y. Mori, Y. Imade, N. Sato, T. Katsumata, D. Mori, *Thermochimica Acta* 532 (2012) 168-171

Acknowledgments: The authors thank FONDECYT (Proyect N₀ 1130114) for financial support for this research.