

Growth of Highly Oriented $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ Thin Films on LaAlO_3 (100) and NdGaO_3 (100) Single Crystals Substrates by a Sol-Gel Method

$\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ (CCTO) thin films have been deposited successfully on LaAlO_3 (100), NdGaO_3 (100) substrates using a sol-gel method and they exhibited highly-preferential orientations. These substrates were chosen in terms of small lattice mismatch between CCTO and the substrate. The X-ray diffraction patterns showed that the CCTO film layers grown on different studied substrates have different preferential orientations. In the case of our CCTO films on LaAlO_3 (100), the $\{h00\}$ were the most prominent reflections while CCTO on NdGaO_3 (100) showed the $\{hh0\}$ dominant reflections. The plane view and cross sectional FE-SEM images showed a smooth and crack-free surface throughout the film with large grains and dense packing. The interface between the CCTO film and the single crystal substrate was sharp. We found evidence that the occurrence of a phase transition in the LAO substrates is detrimental to the film quality. Thus, the optimum temperature for annealing CCTO films on LAO substrates is 800 °C while for NGO substrates the annealing is at 1000 °C. The correlation between the preferred orientations of the films and their dielectric properties were also reported.

References:

- [1] S.K. Hodak, C.T. Rogers, Microstructure and dielectric response of $\text{SrTiO}_3/\text{NdGaO}_3$ interdigitated capacitors, *Microelectron. Eng.* (2008), 85, 444-451.
- [2] S. Pongpaiboonkul, D. Phokharatkul, J.H. Hodak, A. Wisitsoraat, S.K. Hodak, Enhancement of H_2S -sensing performances with Fe-doping in $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ thin films prepared by a sol-gel method, *Sens. Actuators B* (2016), 224, 118-127.

Primary authors: Prof. HODAK, Satreerat (Supervisor); Mr PONGPAIBOONKUL, Suriyong (Ph.D student)

Co-authors: Dr WISITSORAAT, Anurat (Co-supervisor); Mr PHOKHARATKUL, Ditsayut (Co-worker); Prof. HODAK, Jose (co-author)

Presenter: Mr PONGPAIBOONKUL, Suriyong (Ph.D student)

Track Classification: Surface, Interface and Thin Films