

## Synthesis of novel perovskite materials $\text{NaNbO}_3$ doped with sulfur

**Adnan Ali, Brahim Aissa and Fadwa El Melluohi**

Qatar Environment & Energy Research Institute-Hamad Bin Khalifa University, Qatar

**T**he study herein reports the synthesis of  $\text{NaNbO}_3$  powders doped with sulfur. Sulfur doped  $\text{NaNbO}_3$  was synthesized by mixing precursors  $\text{NbCl}_5$ ,  $\text{Na}_2\text{S}_2\text{O}_3$  and sulfur in PTFE chamber of stainless steel hydrothermal unit and heated at  $200^\circ\text{C}$  for 20h. Powdered obtained after centrifugation was calcinated was at  $400^\circ\text{C}$  for 2h in  $\text{N}_2$  controlled environment in a tube furnace. The morpho-structural and optical properties of the obtained materials were analyzed by X-ray diffraction (XRD), scanning electron microscopy (SEM)/electron probe microanalysis (EPMA) and ultraviolet-visible (UV-Vis) spectroscopy. Electron probe microanalysis has

confirmed 12.6% (atomic) of sulfur doping into  $\text{NaNbO}_3$ . Compared to pristine  $\text{NaNbO}_3$ ; energy band gap widening and XRD peaks shifting and broadening have observed for sulfur doped  $\text{NaNbO}_3$  powders. This energy band gap widening is vital and could be a novel Pb-free candidate for Perovskite Solar Cells and other applications. This study opens the doors for further investigations of sulfur doping into  $\text{NaNbO}_3$  perovskite structure to optimize the doping concentration which results in optimum opto-electrical properties and open a broad spectrum of applications for this novel material.

adali@hbku.edu.qa