Study on structure, electrical and dielectric properties of pure and Sr-doped LaCoO3 for chemical sensor application.

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A perovskite LaCoO3 was prepared by combustion and citrate-gel methodsin order to test its possible application as a chemical sensor. The crystal evolution, structure, composition, texture, morphology, and particle size were analyzed by X-ray diffraction, BET and scanning electron microscopies. The effects of doped Sr+2 on crystal structure distortion, magnetic, and electrical properties with perovskites structure La1 xSrxCoO3 where (x = 0.2, 0.5, 0.8) have been investigated also. It was found that La+3 is gradually replaced by Sr+2, the changes from monoclinic to high symmetry cubic with the structure La0.2Sr0.8CoO3, resulting in a change in the bond angle as well as the bond length between Co-O. The changes in bond angle and bond length influence both electrical and magnetic properties of the system as expected. Crystal spilt Calculations predict that the bigger size of Sr+2 reducing the splitting energy gap thus improving the electronic conductivity of perovskites. Also, Sr+2 doping converts Co+3 to Co+4 and brings holes in the p-type semiconductor. Thus, increasing the resistance variation range of LaCoO3, enhancing the sensing performance. The temperature variation of the resistivity shows that these compounds have semiconductor behavior. The frequency dependence of the dielectric constant in these materials indicates that space charge polarization contributes significantly to their observed dielectric parameters.
Keywords: perovskite LaCoO3, Rare earth, chemical sensors, dielectric properties, electrical resistivity.

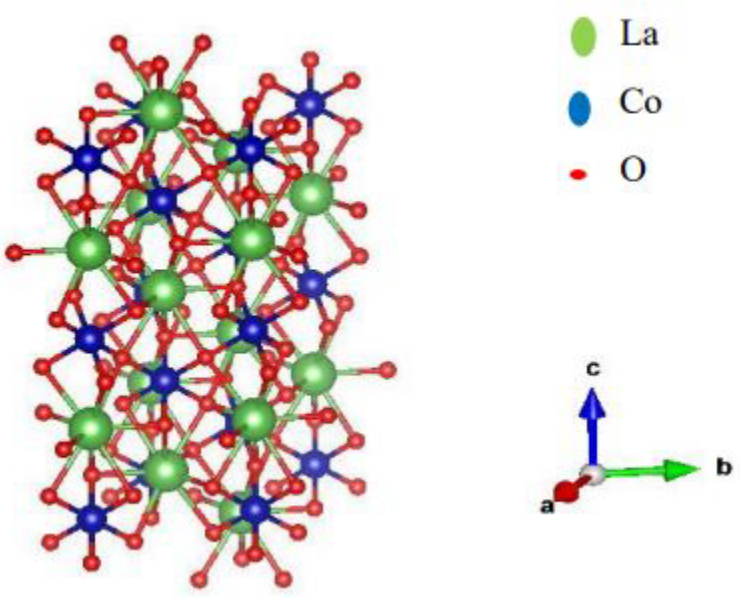

Figure 1