Preparation and infrared characterization of potassium tantalate thin films

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$KTaO_3$ thin films of both pyrochlore and perovskite cubic structures have been prepared using the chemical solution deposition (CSD). The effects of K:Ta sol stoichiometry, substrate, buffer interlayer (Al_2O_3, Y-stabilized ZrO_2, $PbTiO_3$, $PbTiO_3$–Al_2O_3 composite, $KNbO_3$), and annealing regime on the kinetics of pyrochlore to perovskite transition has been studied. The $KTaO_3$ films with the perovskite structure have been successfully deposited on (100)MgO, and (0001)Al_2O_3, and on SiO_2 and Si substrates, when the Al_2O_3 and $KNbO_3$ buffer layers have been used. The IR transmittance spectrum of the films shows three minima corresponding to optical active phonons in the perovskite crystal structure. Their positions are in agreement with the bulk material, except the 14 cm^{-1} shift of the lowest phonon, which has been also observed in other perovskite materials. The temperature dependence of the phonon parameters has been studied, too.