# Kinetic Study of Crystallization Mechanisms of Aurivillius Phases by In-Situ X-ray Diffraction

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In situ high temperature X-ray diffraction was used to probe the kinetics and mechanism of both sol-gel transformation and the solid state reaction for three layered Aurivillius compounds ($Bi_2A_2M_3O_{12}$, where *A*=Bi, Ca, Sr, Ba and *M*= Ti, Nb or Ta). *In-situ* analysis of the decomposition of the polymeric precursor shows that the polymer yields a three-phase mixture consisting of $Bi_2A_2TiM_2O_{12}$ and the metastable δ- and β-polymorphs of $Bi_2O_3$ upon heating under flowing air. Quantitative analysis show that inducing the fluorite structure $Bi_{12}TiO_{20}$ at the initial stage of solid state reaction would accelerate reaction diffusion with lower activation energies for the crystallization.