

Supplementary Material

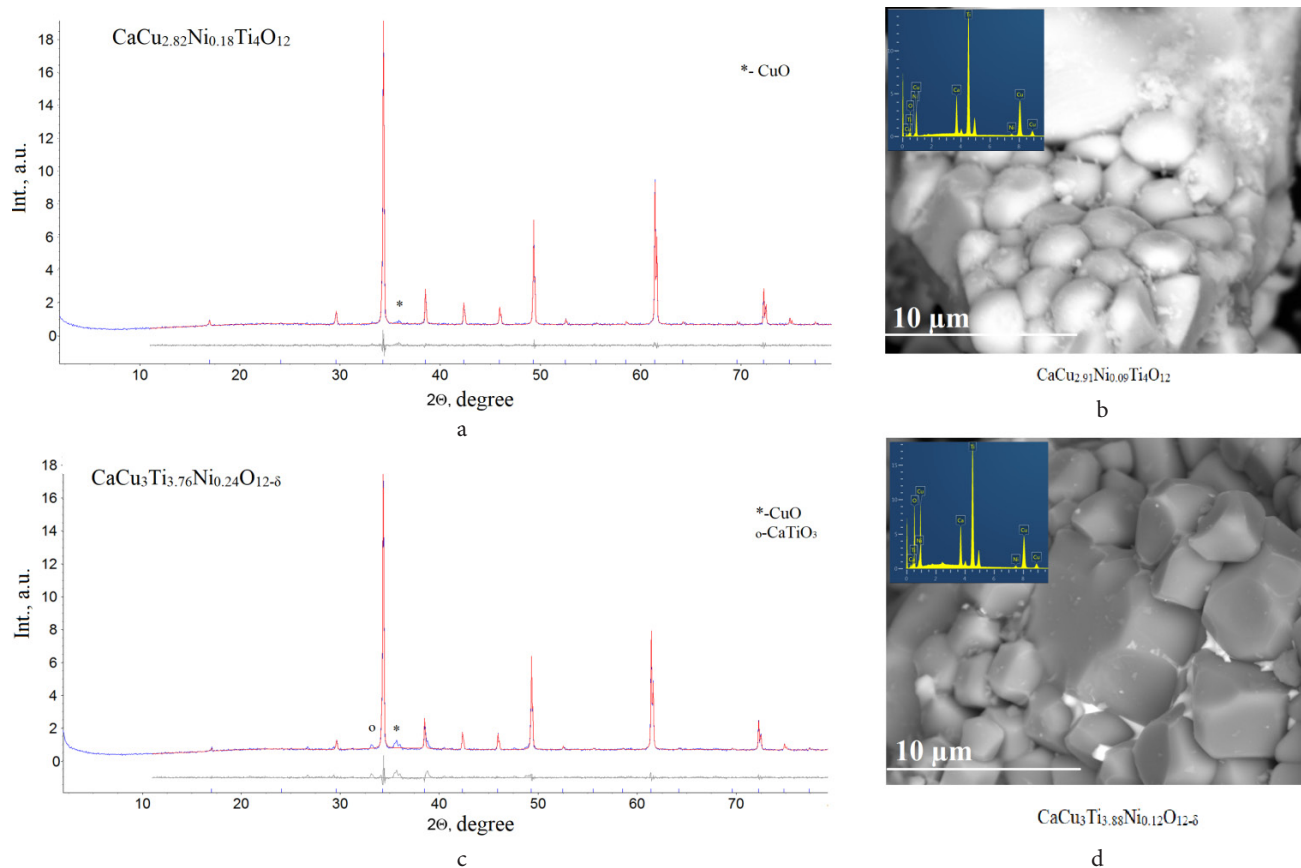


Fig. S1. X-ray diffraction patterns and the microphotographs of the surface of $\text{CaCu}_{3-3x}\text{Ni}_{3x}\text{Ti}_4\text{O}_{12}$ (a, c) and $\text{CaCu}_3\text{Ti}_{4-4x}\text{Ni}_{4x}\text{O}_{12-\delta}$ (b, d) at $x=0.06$ (a, b) and 0.03 (c, d).

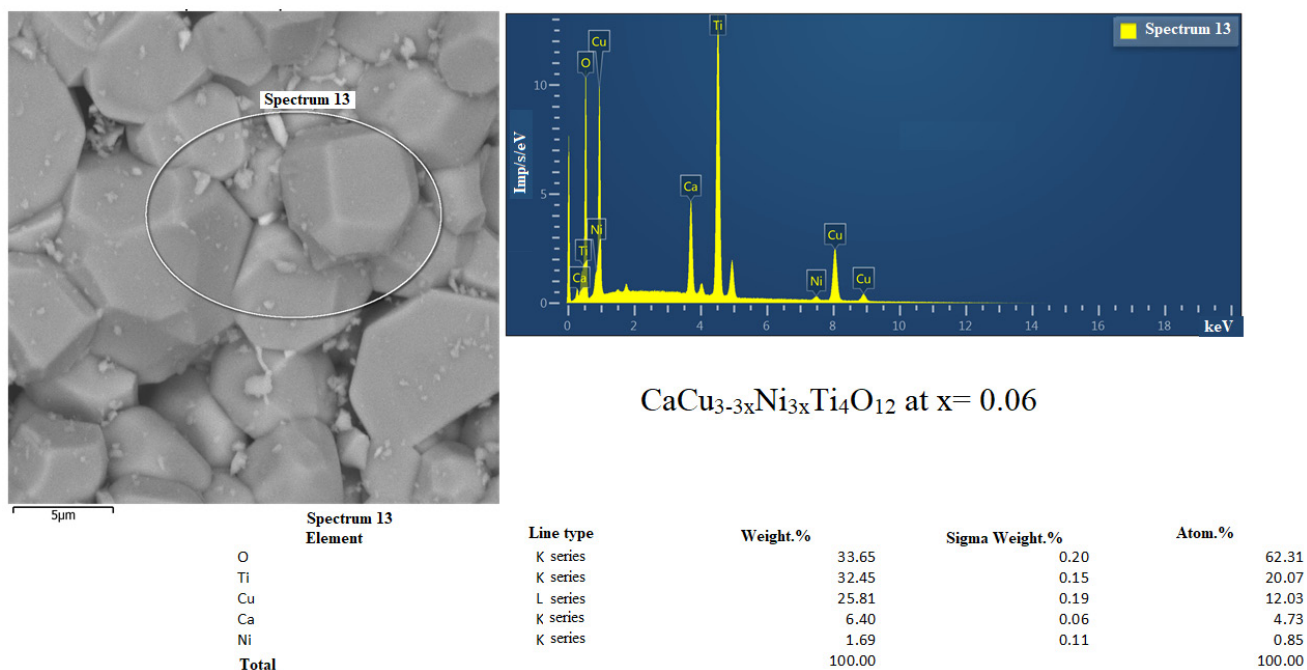


Fig. S2. EDS-spectrum and the microphotograph of the $\text{CaCu}_{3-3x}\text{Ni}_{3x}\text{Ti}_4\text{O}_{12}$ at $x=0.06$.

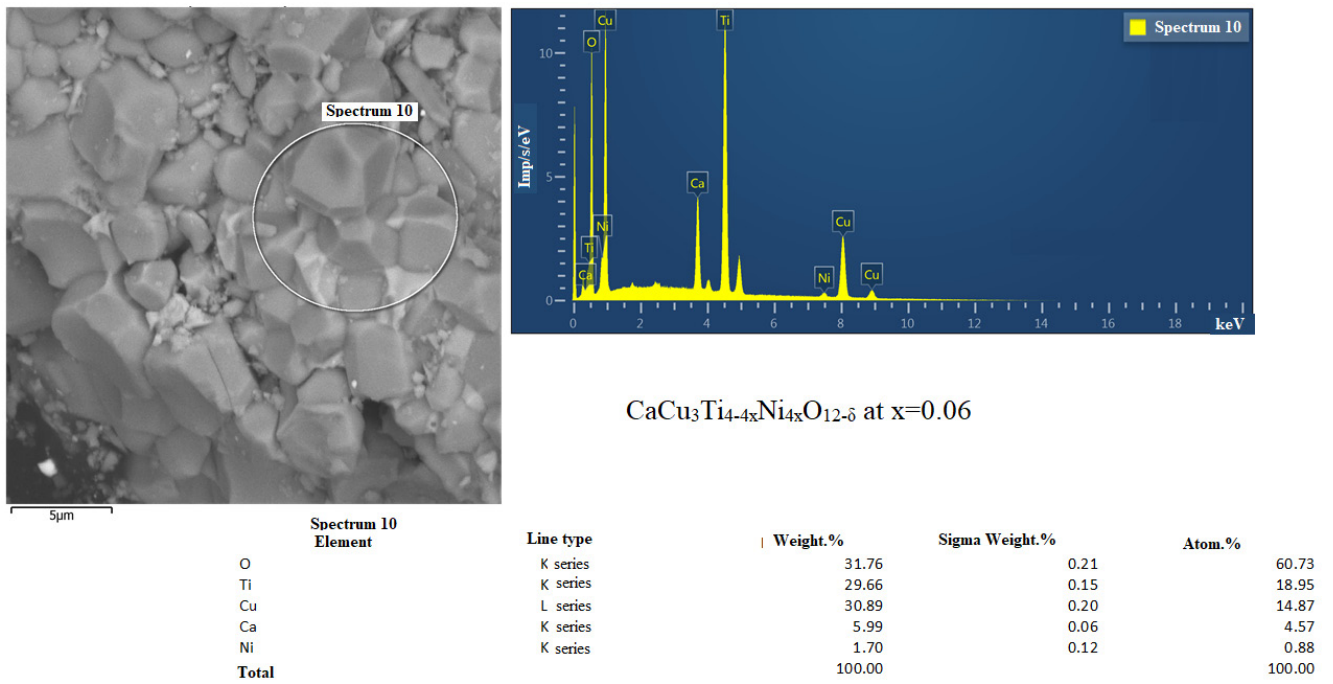


Fig. 53. EDS-spectrum and the microphotograph of the $\text{CaCu}_3\text{Ti}_{4-4x}\text{Ni}_{4x}\text{O}_{12-\delta}$ at $x=0.06$.

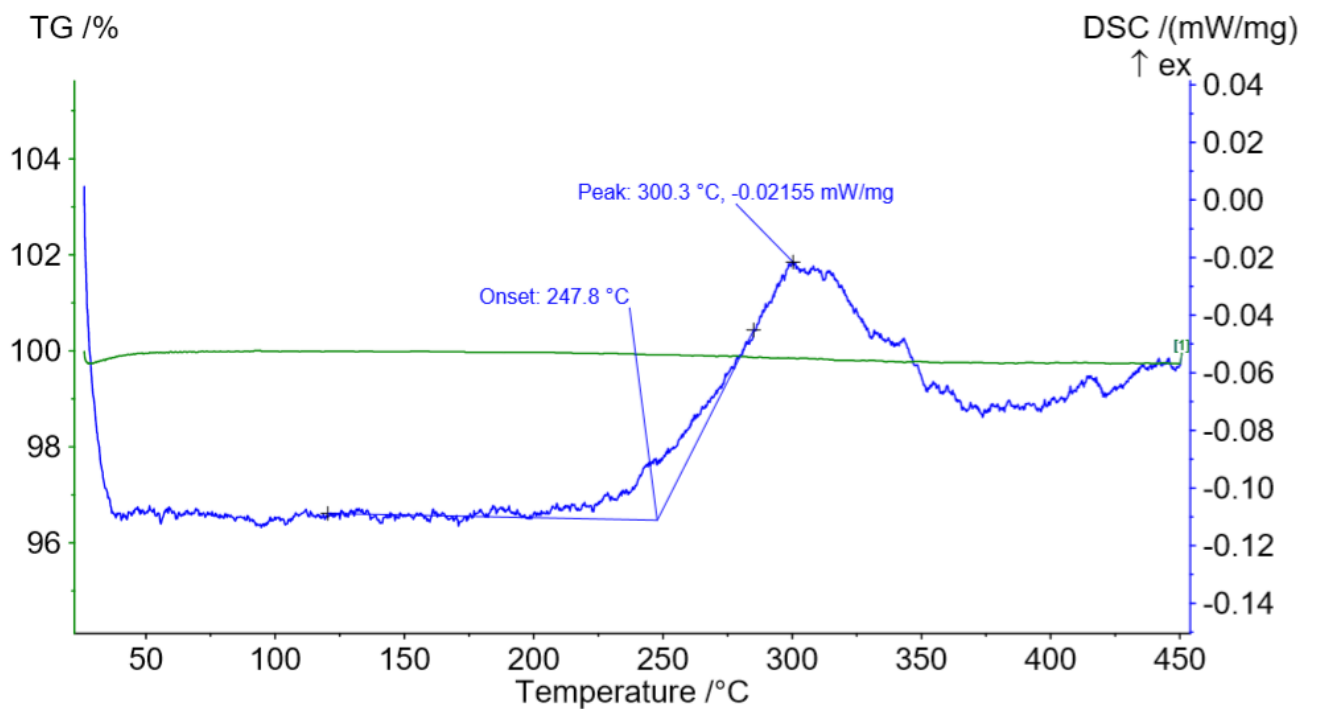


Fig. 54. TG and DSC curves of the $\text{CaCu}_{2.91}\text{Ni}_{0.09}\text{Ti}_4\text{O}_{12}$ in the range of 293 – 723 K.

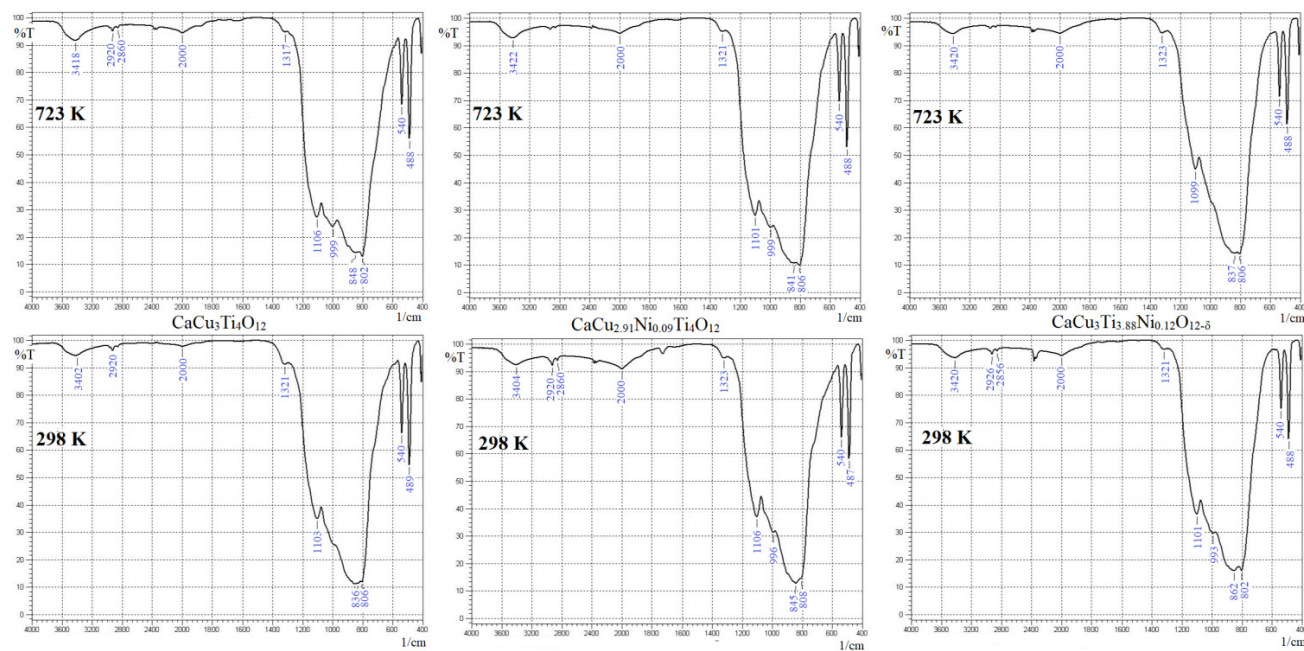


Fig. S5. Comparison of FTIR spectra of the CCTO, $\text{CaCu}_{3-3x}\text{Ni}_{3x}\text{Ti}_4\text{O}_{12}$ and $\text{CaCu}_3\text{Ti}_{3-4x}\text{Ni}_{4x}\text{O}_{12-\delta}$ ($x=0.03$) samples calcinated at a temperature of 723 K for 180 min with samples stored in the air (298 K).

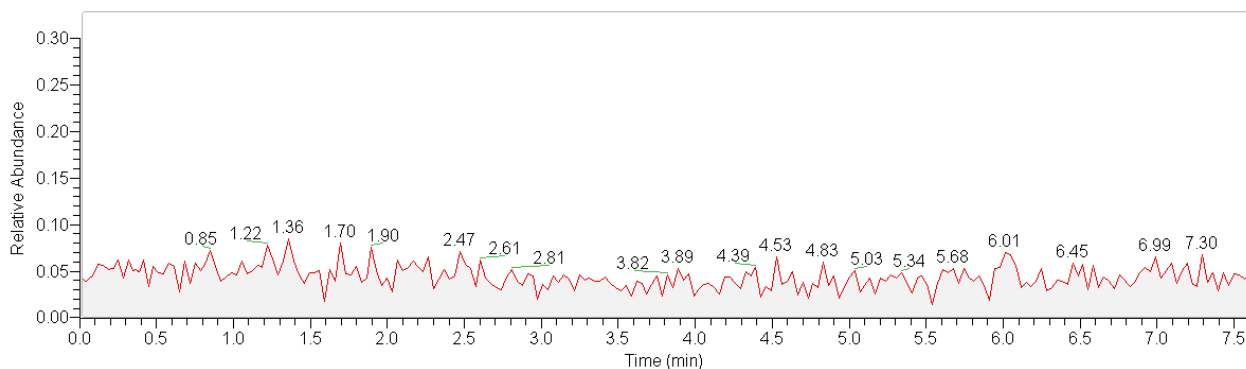


Fig. S6. The mass spectrum for $\text{CaCu}_{3-3x}\text{Ni}_{3x}\text{Ti}_4\text{O}_{12}$ ($x=0.03$).