

Figure 1S Diffraction patterns for all synthesized multicomponent oxides

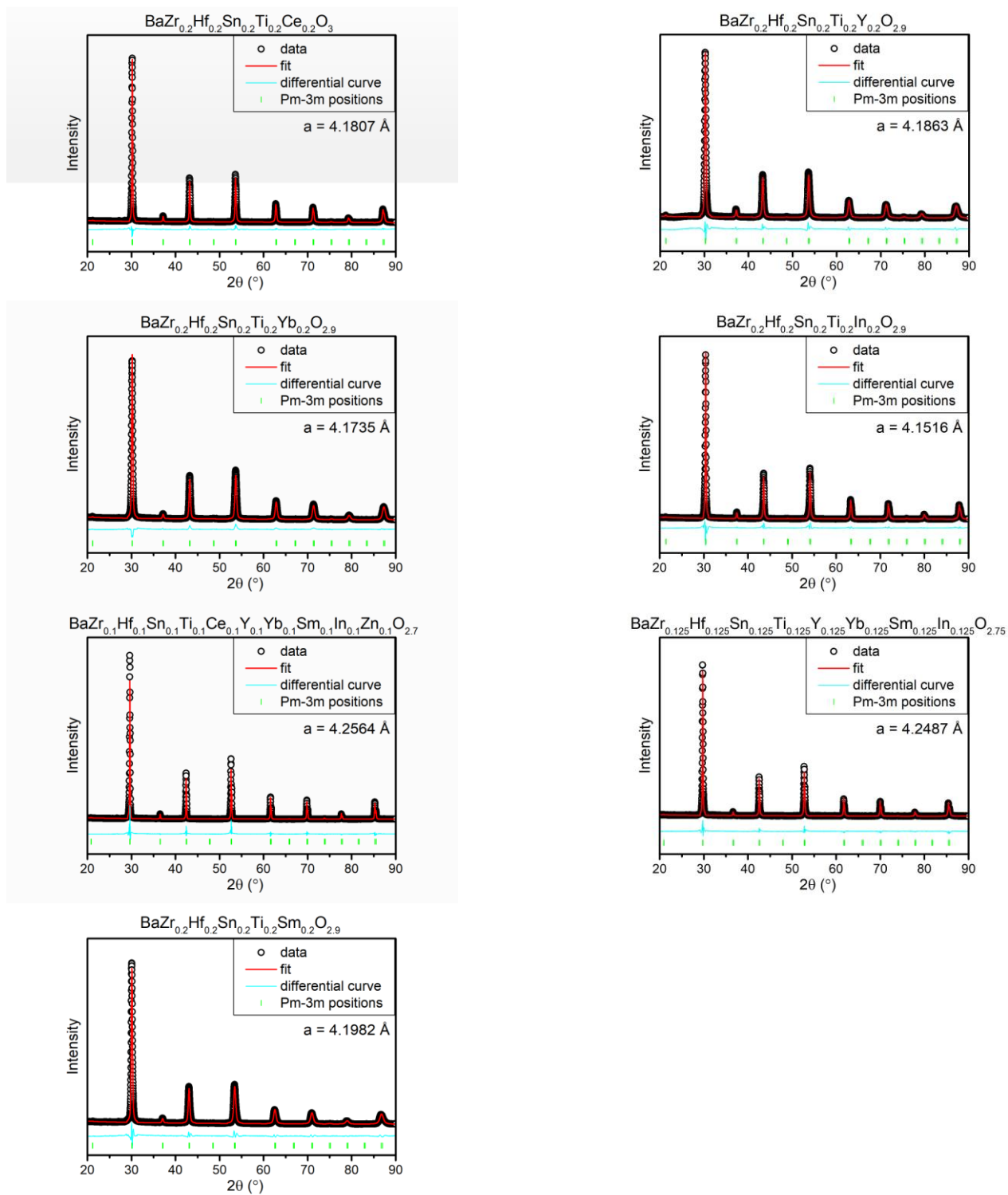


Figure 2S Rietveld refinements of diffraction patterns of all synthesized multicomponent oxides

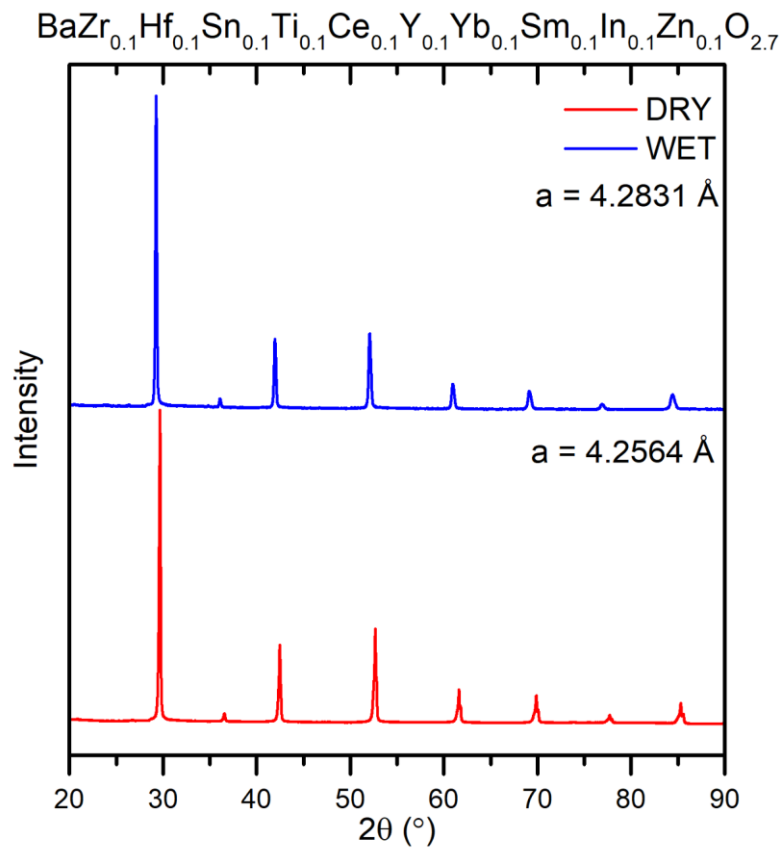


Figure 3S Comparison of diffraction patterns of dry and hydrated BZHST_Ce_Y_In_Sm_Yb_Zn sample.

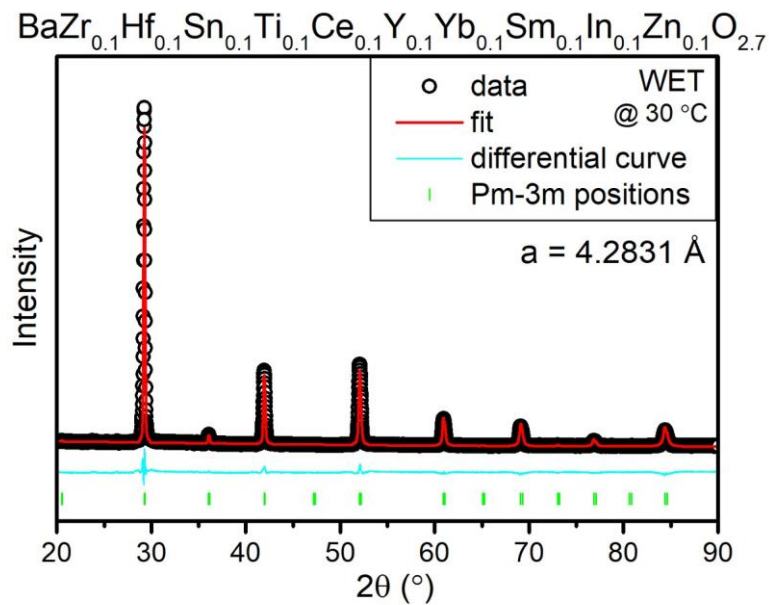


Figure 4S Rietveld refinement of diffraction pattern of hydrated BZHST_Ce_Y_In_Sm_Yb_Zn sample

Sample ID	Refinement quality			Structural data		
	R _{exp}	R _p	R _{WP}	a (Å)	density (g/cm ³)	micro strain (%)
BZHST_Ce	0.79455	3.50065	4.58081	4.1807(1)	6.83	0.11
BZHST_Y	0.72324	3.64943	4.91302	4.1863(1)	6.54	0.27
BZHST_Yb	0.8244	3.05118	3.98956	4.1735(1)	6.98	0.25
BZHST_In	0.83595	3.98727	5.88821	4.1516(1)	6.82	0.10
BZHST_Sm	0.72601	3.032	4.1787	4.1982(1)	6.76	0.30
BZHST_Y_In_Sm_Yb	2.08172	3.91512	5.60402	4.2487(1)	6.53	0.06
BZHST_Ce_Y_In_Sm_Yb_Zn	0.78597	5.70646	8.13871	4.2564(1)	6.40	0.17

Table 1S Refinement quality and structural data derived from Rietveld refinement for all synthesized samples

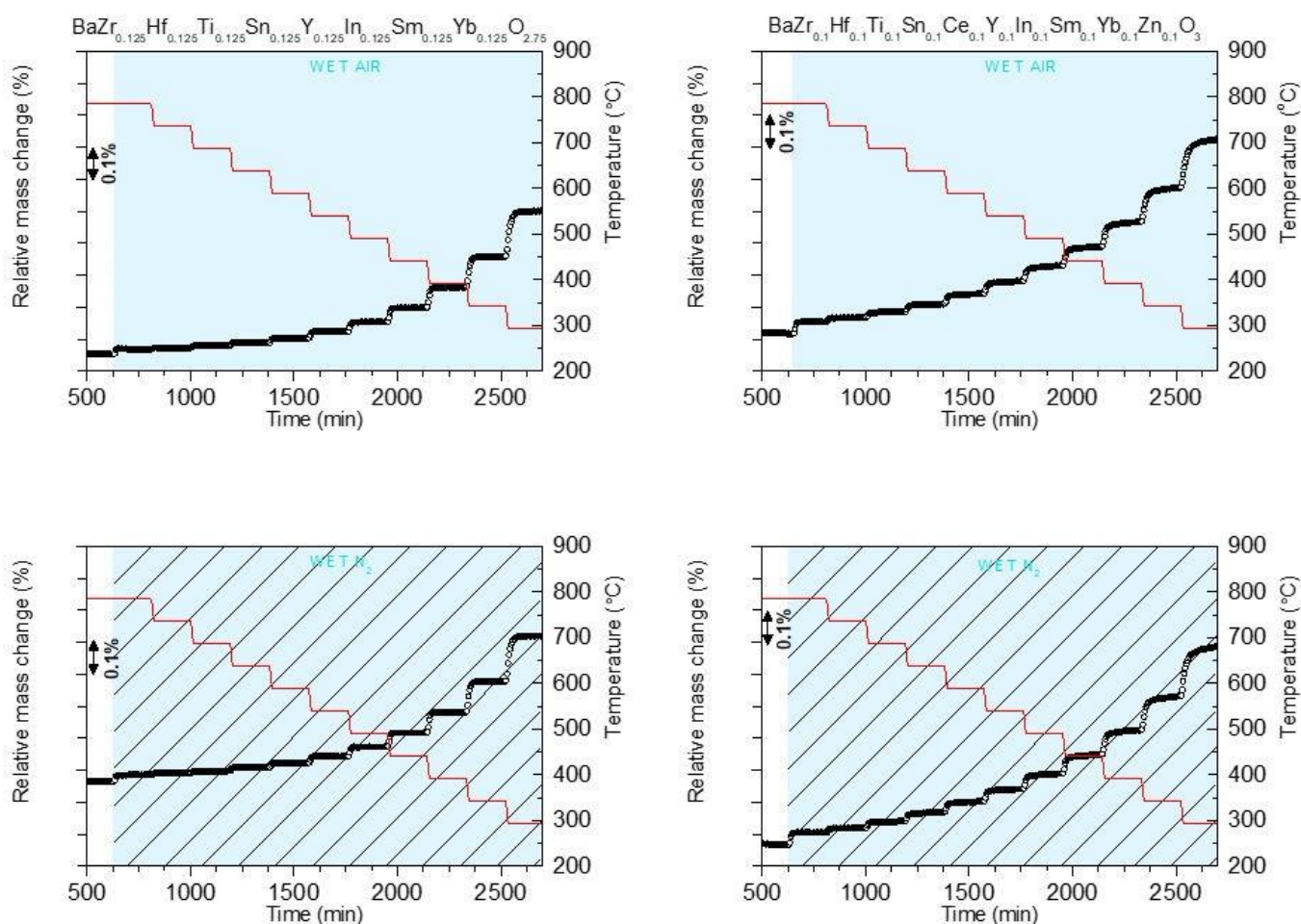


Figure 5S Mass change of BZHST_Y_In_Sm_Yb (left) and BZHST_Ce_Y_In_Sm_Yb_Zn (right) samples and temperature as a function of time under a water partial pressure of 0.019 atm collected in synthetic air and nitrogen atmospheres.