

Harmonic NaNbO₃ and KNbO₃ nanoparticles via solvothermal synthesis in glycols

Laura Vittadello,^{a,c,d} Matthias König,^{b,c} Jan Klenen,^{a,c} Lisa Priggemeyer,^{a,b} Mirco Imlau,^{a,c} and Karsten Kömpe^{*b,c}

Electronic Supplementary Informations (ESI)

Table 1 Results of the Rietveld analyses of all samples.

NaNbO ₃ :		Proportions			
Sample	size NaNbO ₃ [nm]	NaNbO ₃ [%]	Nb ₂ O ₅ [%]	Na ₇ (H ₃ O)(Nb ₆ O ₁₉)(H ₂ O) ₁₄ [%]	Na ₂ C ₂ O ₄ [%]
NN-h-1	96	97	3		
NN-h-2	34	69	31		
NN-h-3	97	21	7	72	
NN-h-4				100	
NN-t-1	86	100			
NN-t-2	162	100			
NN-t-3				100	
NN-t-4				100	
NN-Ox-1	56	90			10
NN-Ox-2	81	90			10
NN-Ox-3	195	67		19	14
NN-Ox-4	94	68		15	17
NN-tb-1	9	72		15	13
NN-tb-2	6	85.2		0.2	14.6
NN-tb-3	16	55		0.35	44.65
NN-tb-4	6	99		1	

KNbO ₃ :		
Sample	size KNbO ₃ [nm] (orthorhombic)	size KNbO ₃ [nm] (monoclinic)
KN-h-1	16	17
KN-h-2	58	71
KN-h-3	49	
KN-h-4	62	
KN-t-1	24	28
KN-t-2	48	
KN-t-3	56	50
KN-t-4	45	
KN-Ox-1		
KN-Ox-2	36	
KN-Ox-3	101	
KN-Ox-4	145	108
KN-tb-1		
KN-tb-2	5	10
KN-tb-3	7	7
KN-tb-4	4	4

glycol	boiling point [° C]	dipole moment* [10 ⁻³⁰ C · m]
EG	197	7.94
DEG	244	8.97
TrEG	291	9.97
TEG	327	10.84

^a Department of Mathematics/Informatics/Physics, University of Osnabrück, Barbarastraße 7, D-49076 Osnabrück, Germany

^b Department of Biology/Chemistry, University of Osnabrück, Barbarastraße 7, D-49076 Osnabrück, Germany

^c Research Center of Cellular Nanoanalytics Osnabrück, University of Osnabrück, Barbarastraße 11, D-49076 Osnabrück, Germany

^d Université Savoie Mont Blanc, SYMME, F-74000 Annecy, France

[§] current address: Melos GmbH, Bismarckstraße 4-10, D-49324 Melle, Germany

[‡] current address: Domschule Osnabrück, Herrenteichswall 2, D-49074 Osnabrück, Germany

* T. Uchida, Y. Kurita, N. Koizumi and M. Kubo, Journal of Polymer Science, 1956, **21**, 313–322

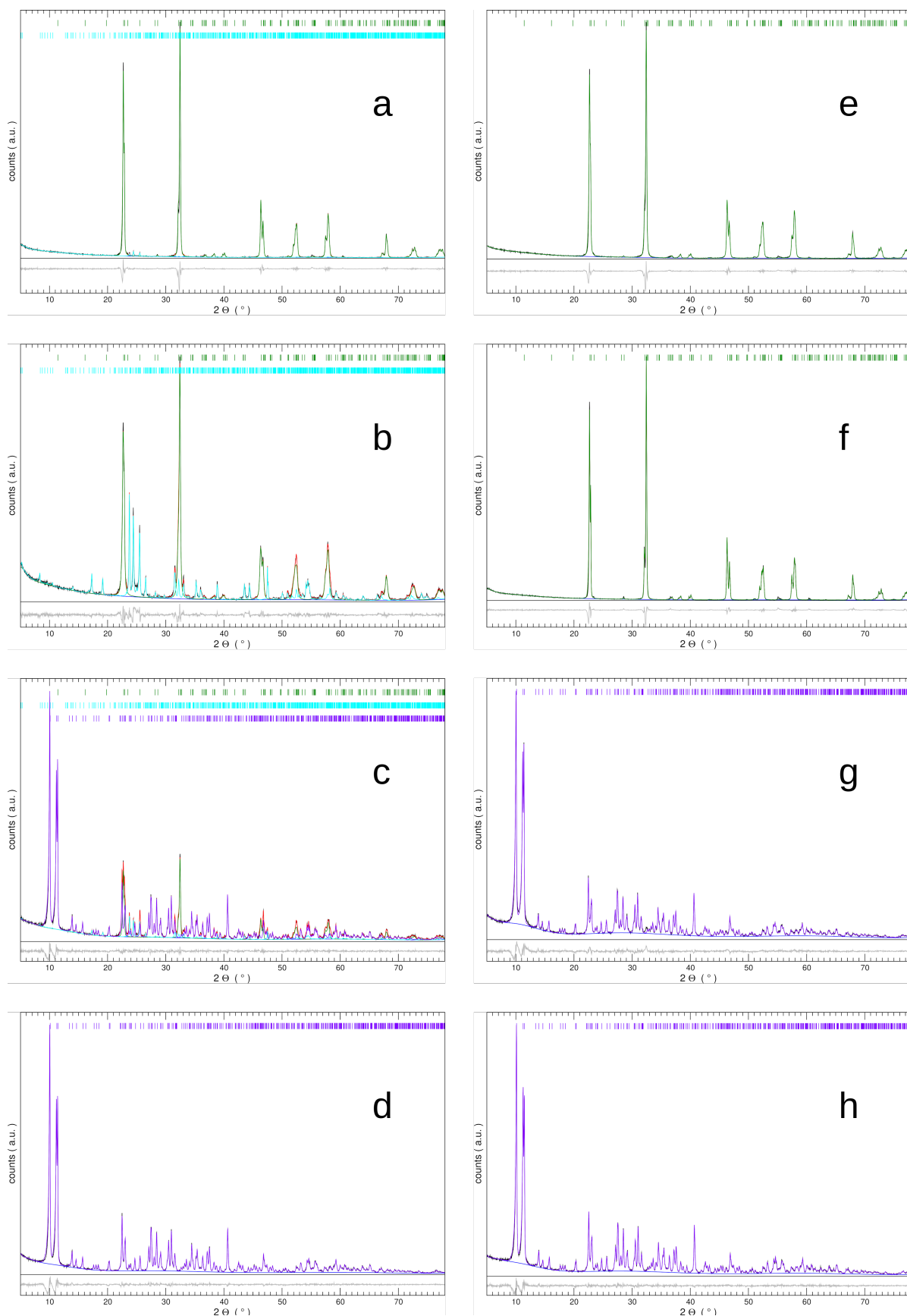


Fig. S 1 Diffractograms of the samples synthesized with the niobium oxides (h-form and t-form) and sodium hydroxide: a NN-h-1, b NN-h-2, c NN-h-3, d NN-h-4, e NN-t-1, f NN-t-2, g NN-t-3 and h NN-t-4. Colors are: Measurement |, fit |, background |, residual |, NaNbO_3 |, Nb_2O_5 | and $\text{Na}_7(\text{H}_3\text{O})(\text{Nb}_6\text{O}_{19})(\text{H}_2\text{O})_{14}$ |.

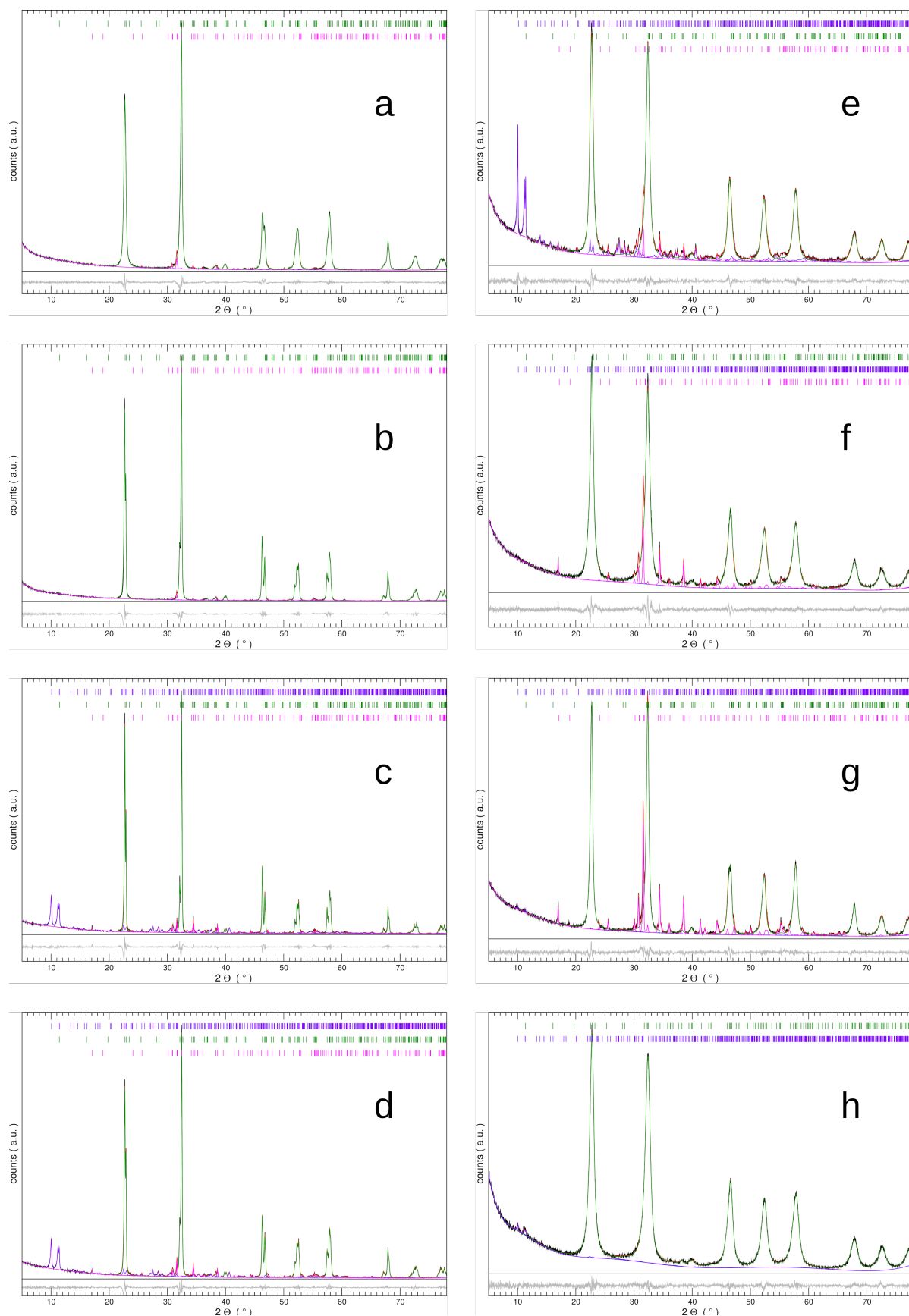


Fig. S 2 Diffractograms of the samples synthesized with niobium oxalate and sodium hydroxide: a NN-Ox-1, b NN-Ox-2, c NN-Ox-3, d NN-Ox-4 and with niobium oxalate and sodium tert-butoxide: e NN-tB-1, f NN-tB-2, g NN-tB-3 and h NN-tB-4. Colors are: Measurement | , fit | , background | , residual | , NaNbO_3 | , $\text{Na}_7(\text{H}_3\text{O})(\text{Nb}_6\text{O}_{19})(\text{H}_2\text{O})_{14}$ | and $\text{Na}_2\text{C}_2\text{O}_4$ | .

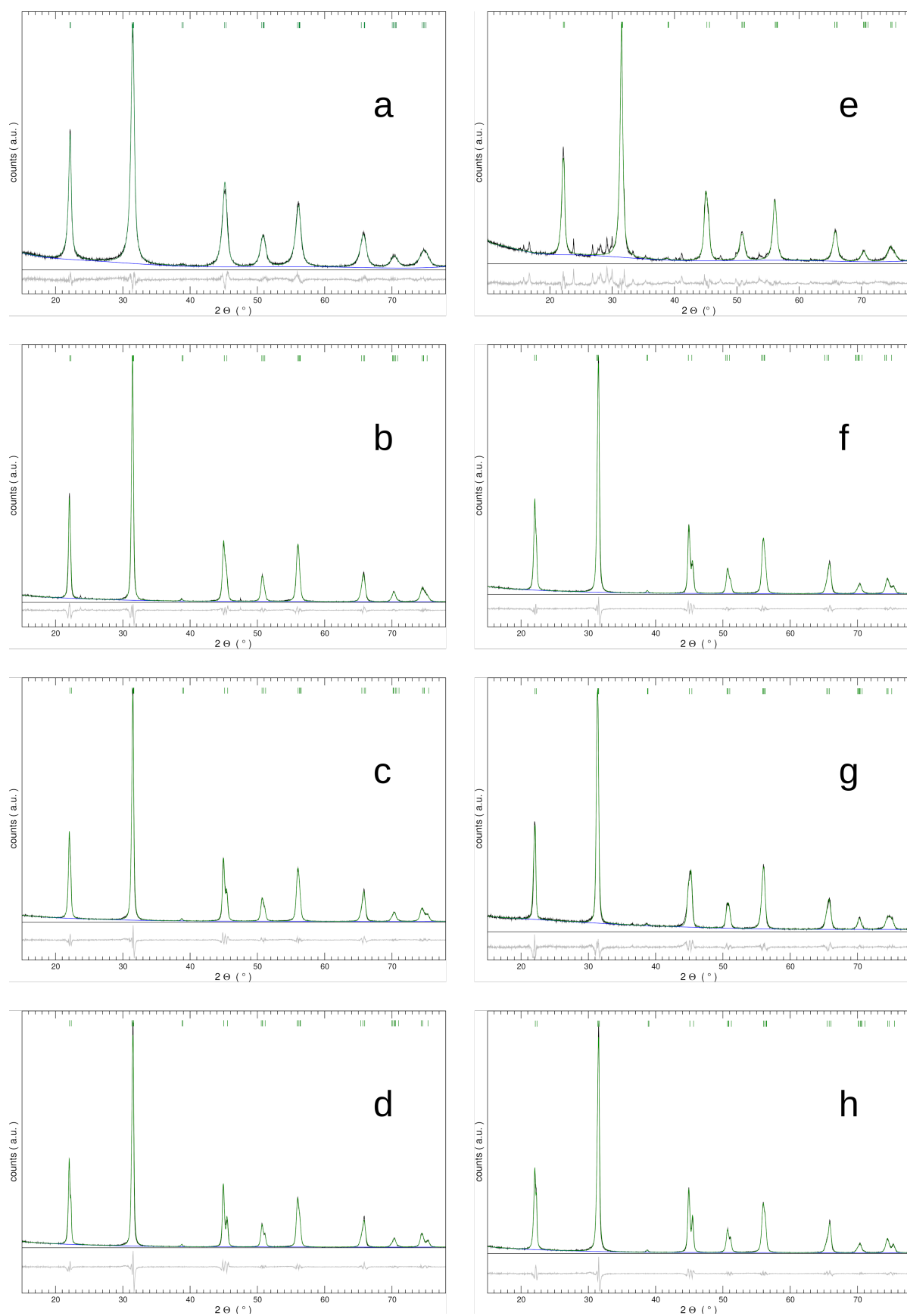


Fig. S 3 Diffractograms of the samples synthesized with the niobium oxides (h-form and t-form) and potassium hydroxide: a KN-h-1, b KN-h-2, c KN-h-3, d KN-h-4, e KN-t-1, f KN-t-2, g KN-t-3 and h KN-t-4. Colors are: Measurement | , fit | , background | , residual | and KNbO_3 | .

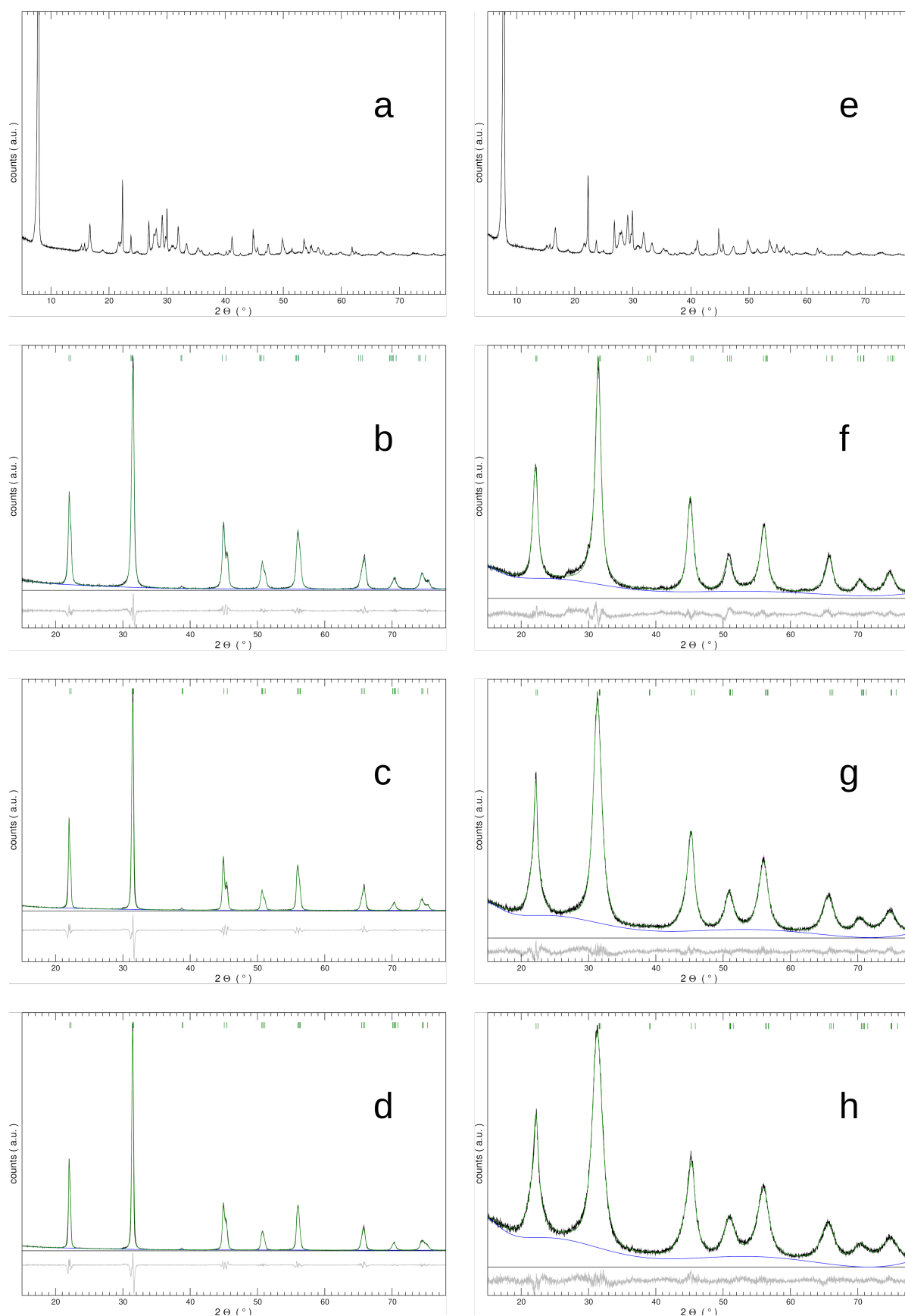


Fig. S 4 Diffractograms of the samples synthesized with niobium oxalate and potassium hydroxide: a KN-Ox-1, b KN-Ox-2, c KN-Ox-3, d KN-OX-4 and niobium oxalate and potassium tert-butoxide: e KN-tB-1, f KN-tB-2, g KN-tB-3 and h KN-tB-4. Colors are: Measurement | , fit | , background | , residual | .