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Supplementary Information for:

Controlling the Crystallisation of Oxide Materials by Solvothermal Chemistry: Tuning Composition, Substitution and Morphology of Functional Solids

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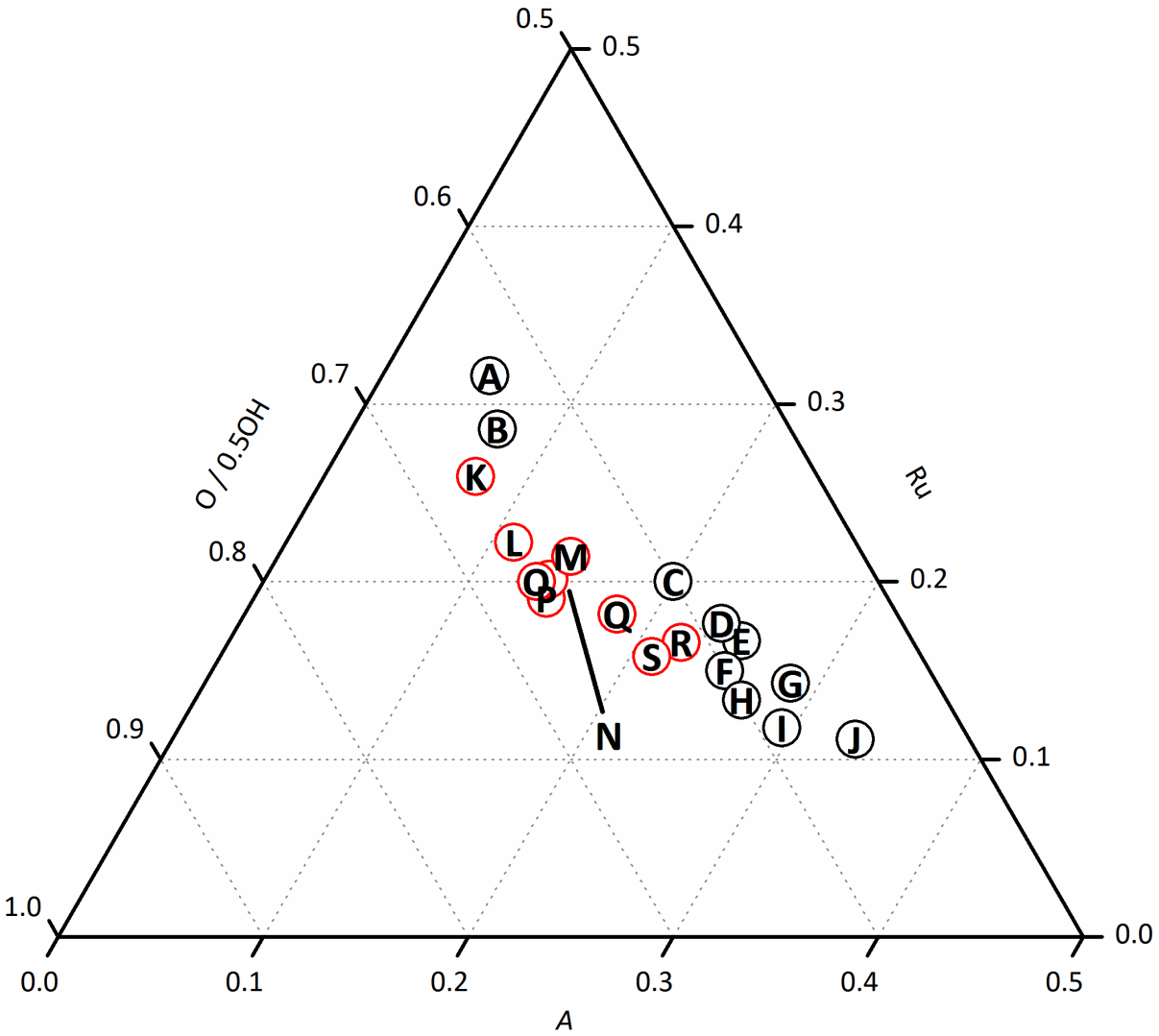

Figure S1. Ternary phase diagram of alkaline-earth ruthenium oxides and oxy-hydroxides. Red circles represent hydrothermally prepared materials which black circles represent those materials prepared using solid-state synthesis.

Table S1. Composition of each alkaline-earth ruthenium oxide and oxyhydroxide, labelled A – S in Figure S1. Note some compositions contain multiple polymorphs.

	Composition	**Reference**
A	$BaRu_6O_{12}$	Torardi[1]
B	$BaRu_4O_9$	Popova[2]
C	$ARuO_3$	*A* = Ca, Sr: Callaghan *et al.*[3] *A* = Ba: Donohue *et al.*;[4] Hong and Sleight;[5] Ogawa and Sato[6]*
D	$A_4Ru_3O_{10}$	*A* = Sr: Crawford *et al.*[7] *A* = Ba: Dussarrat *et al.*[8]
E	$A_3Ru_2O_7$	*A* = Ca: Yoshida *et al.*[9] *A* = Sr: Malvestuto *et al.*[10]
F	$Ba_5Ru_3O_{12}$	Dussarrat *et al.*[8]
G	A_2RuO_4	*A* = Ca: Nakatsuji *et al.*[11] *A* = Sr: Ishida *et al.*[12] *A* = Ba: Kafalas and Longo[13]
H	$Sr_4Ru_2O_9$	Dussarrat *et al.*[14]
I	$Ba_5Ru_2O_{10}$	Dussarrat *et al.*[15]
J	Ba_3RuO_5	Gadzhiev and Shaplygin[16]
K	$Ba_2Ru_7O_{18}$	Ogawa and Sato[6]
L	$SrRu_2O_6$	Hiley *et al.*[17]
M	$(Ba_{1-x}Sr_x)_2Ru_3O_9$	Sato *et al.*[18]
N	$Ba_2Ru_3O_9(OH)$	Hiley *et al.*[17]
O	$Sr_2Ru_3O_{10}$	Renard *et al.*[19]
P	$Ca_{1.5}Ru_2O_7$	Hiley *et al.*[17]
Q	$Ca_2Ru_2O_7$	Munenaka and Sato.[20]
R	$Ba_4Ru_3O_{10.2}(OH)_{1.8}$	Hiley *et al.*[21]
S	$Sr_4Ru_3O_{12}$	Renard *et al.*[22]

*10H-$BaRuO_3$ polymorph was prepared hydrothermally.

Table S2. Maximum degree of substitution in CeO_2, *x*, as summarised in Figure 5.

Element	Maximum *x* (solvothermal)	Maximum *x* (other synthesis, where greater than solvothermal)
N		*0.09; Jorge *et al.*[23]
F		*0.10; Ahmad *et al.*[24]
Na	0.02; Wright *et al.*[25]	0.07; Pearce and Thangadurai[26]
Mg	0.20; Zhou and Rahaman[27]	
Al	0.20; Dong *et al.*[28]	
Ca	0.20; Yamashita *et al.* [29]	
Sc		0.05; Jain *et al.*[30]
Ti	0.40; Singh and Hegde[31]	
Cr	0.33; Singh and Hegde[32]	
Mn		0.50; Machida *et al.*[33]
Fe	0.15; Li *et al.*[34]	0.50; Kamimura *et al.*[35]
Co		0.10; Younis *et al.*[36]
Ni	<0.10; Liu *et al.*[37]	0.15; Mahammadunnisia *et al.*[38]
Cu	0.05; Wang *et al.*[39]	0.20; Hočevar *et al.*[40]
Ga		0.25; Collins *et al.*[41]
Sr	0.20; Yamashita *et al.* [29]	
Y	0.50; Singh *et al.*[31]	1; Etsell and Flengas[42]
Zr	0.50; Singh *et al.*[31]	1; Etsell and Flengas[42]
Nb		0.014; Ramirez-Cabrera *et al.*[43] Possibly 0.1; Zhao and Gorte[44]
Mo		0.15; Jose and Suganan[45]
Ru	0.10; Singh and Hegde[46]	
Rh		0.11; Kurnatowska and Kepinski[47]
Pd		0.21; Kurnatowska *et al.*[48]
In		0.30; Bhella *et al.*[49]
Sn	0.10; Xiao *et al.*[50]	0.50; Baidya *et al.*[51]
Ba	~0.07; Zhao and Feng[52]	
La	0.30; Dikmen *et al.*[53]	0.60; Horlait *et al.*[54]
Pr	0.50; Shuk and Greenblatt[55]	
Nd	0.05; Dikmen[56]	0.63; Etsell and Flengas[42]
Sm	0.30; Huang *et al.*[57]	1; Etsell and Flengas[42]
Eu	0.30; Shuk *et al.*[58]	1; Etsell and Flengas[42]
Gd	0.30; Tok *et al.*[59]	1; Etsell and Flengas[42]
Tb	0.30; Shuk *et al.*[58]	0.80; Ye *et al.*[60]
Dy		1; Etsell and Flengas[42]
Ho		0.40; Mandal *et al.*[61]
Er		0.40; Mandal *et al.*[61]
Tm		0.40; Mandal *et al.*[62]
Yb		0.33; Etsell and Flengas
Lu		0.50; Mista *et al.*[63]
Hf	0.25; Jiang *et al.*[64]	0.50; Baidya *et al.*[65]
Ta		0.50; Le Gal and Abanades[66]
W		0.0026; De Guire *et al.*[67]
Pt		0.02; Bera *et al.*[68]

*Anion substitution; *z*

Element	Maximum *x* (solvothermal)	Maximum *x* (other synthesis, where greater than solvothermal)
Au		0.03; Venezia *et al.*[69]
Pb	0.20; Zhang *et al.*[70]	
Bi	0.60; Sardar *et al.*[71]	
Th		1; Bukaemskiy *et al.*[72]
U		1; Al-Salik *et al.*[73]
Pu		1; Mulford *et al.*[74]
Am		0.0033; Kolbe *et al.*[75]

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