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**Supporting information for article:**

**Incommensurately modulated crystal structure of  $\alpha'$  ( $O'3$ )-type sodium cobalt oxide  $NaxCoO_2$  ( $x \sim 0.78$ )**

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Table S1. Refined modulation vector components  $\mathbf{k} = \alpha\mathbf{a}^* + \gamma\mathbf{c}^*$ , lattice parameters, occupancies of atoms, displacive modulation wave amplitudes of cosine terms  $A_n$  and sine terms  $B_n$ , slope, and isotropic atomic displacement parameters  $U_{\text{iso}}$  for  $\alpha'\text{-Na}_x\text{CoO}_2$  at 10 K.

$\alpha = 0.3466(3)$ , $\gamma = -0.2630(3)$						
$a = 4.8869(2)\text{\AA}$ , $b = 2.86642(8)\text{\AA}$ , $c = 5.7585(2)\text{\AA}$ , $\beta = 111.870(2)^\circ$						
Atom	Wave	Occupancy	x	y	z	$U_{\text{iso}} (\text{\AA}^2)$
Na	$A_0$	-	0	1/2	1/2	0.0043(13)
	$A_1$		0	0	0	
	$B_1$		-0.033(5)	0	0.043(4)	
	$A_2$		0	0	0	
	$B_2$		0	0	0	
	slope		0.225(6)	0	-0.014(5)	
Co	$A_0$	1.0 (fixed)	0	0	0	0.0080(9)
	$A_1$		0	0	0	
	$B_1$		0.0315(15)	0	0.0532(12)	
	$A_2$		0	0	0	
	$B_2$		0.003(3)	0	-0.006(2)	
O	$A_0$	1.0 (fixed)	0.2543(3)	0	0.8157(2)	0.0080(4)
	$A_1$		0.0181(6)	0	-0.0059(5)	
	$B_1$		0.0299(5)	0	0.0501(3)	
	$A_2$		0.0057(9)	0	0.0006(8)	
	$B_2$		-0.0027(10)	0	-0.0024(5)	

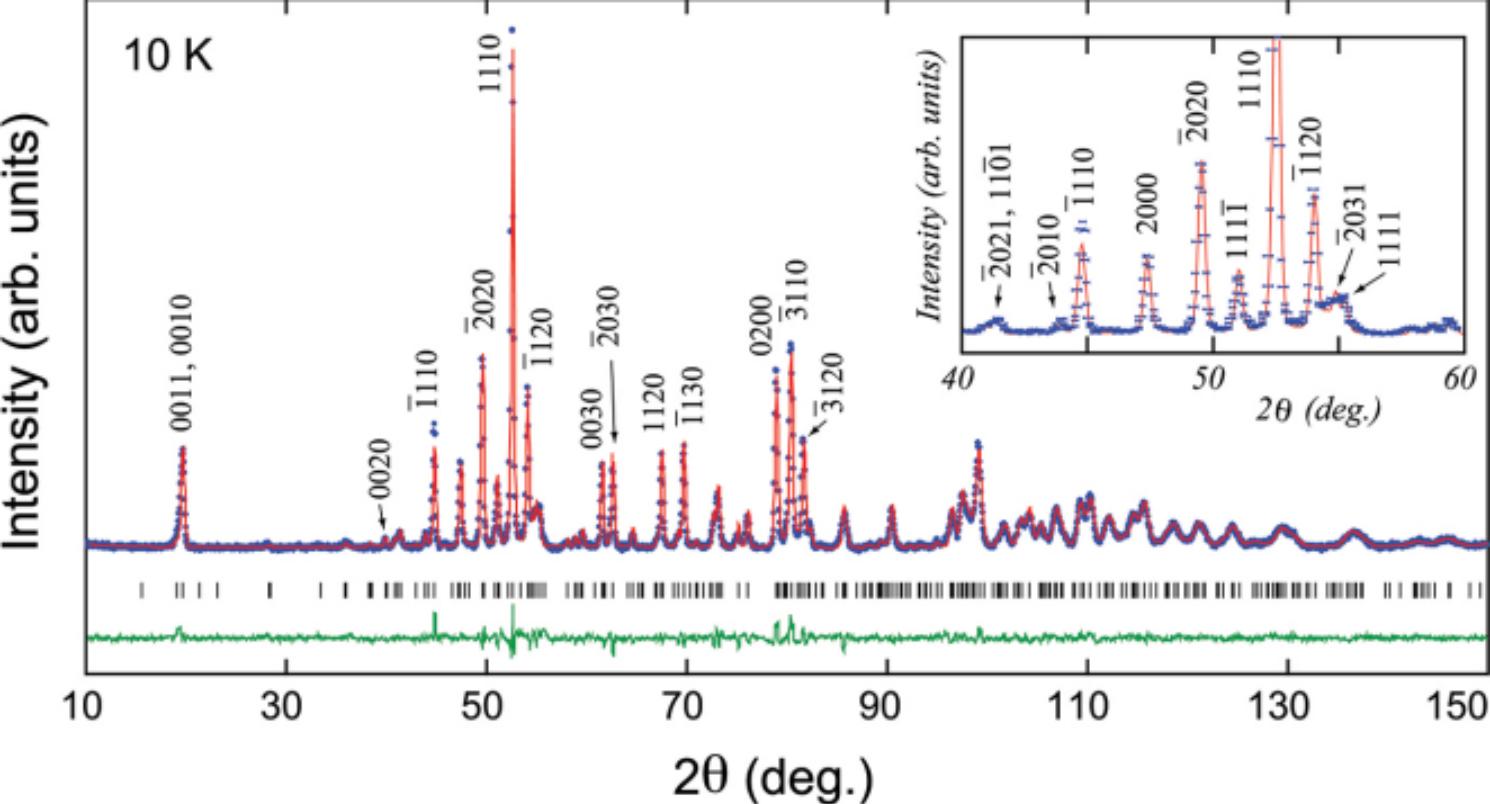


Fig. S1. Observed, calculated and difference profiles of powder neutron diffraction data for  $\alpha'$ -NaxCoO<sub>2</sub> measure at 10 K. The inset shows an enlarged view of the region.

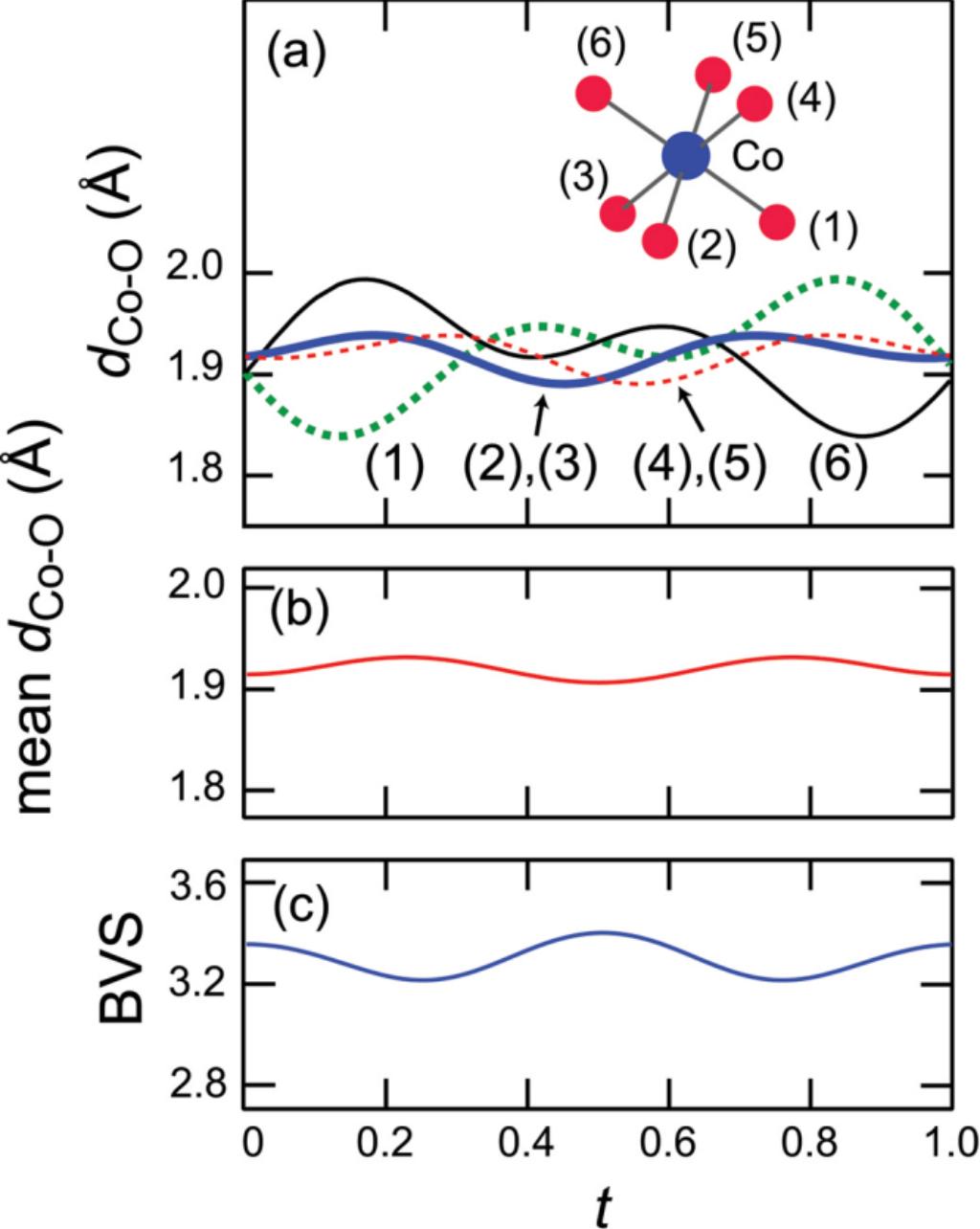


Fig.S2. Determined Co-O distances (a), mean Co-O distance (b) and bond valence sum (BVS) of the Co ions (c) at 293 K plotted against  $t$ .