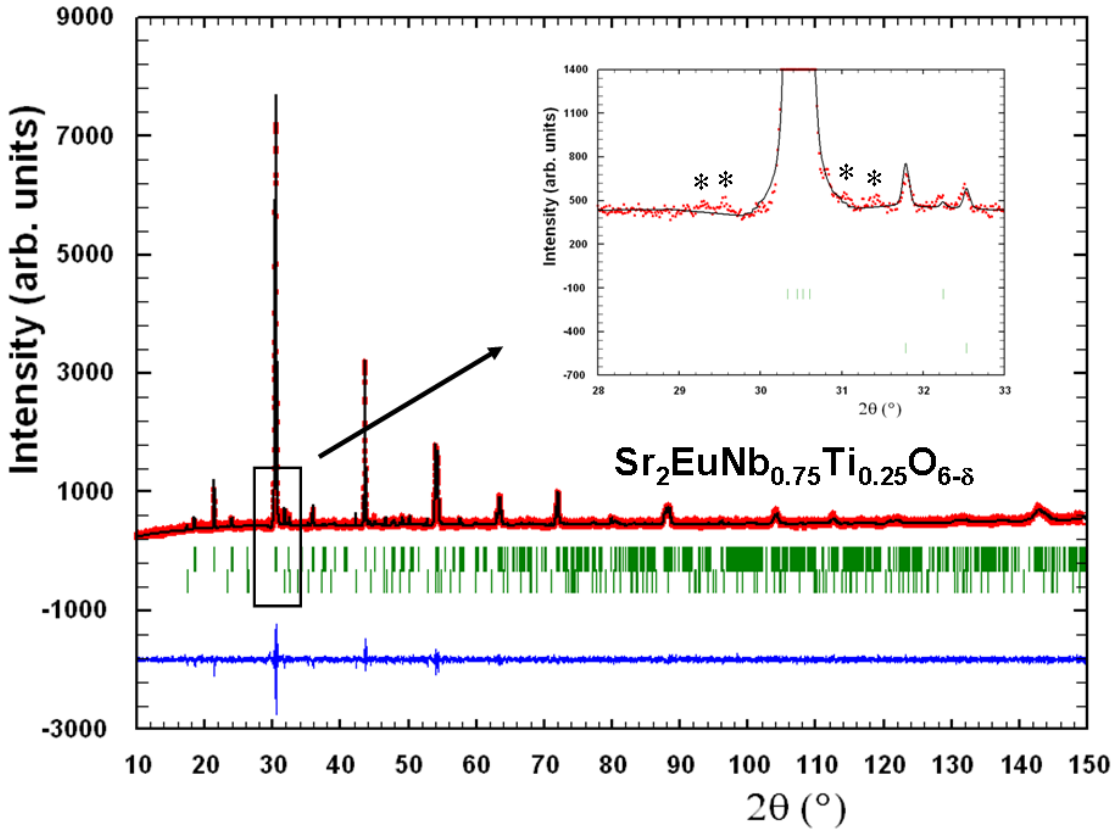

Figure SI 1. Experimental (red points), calculated (black solid line) and their difference (blue line at bottom) XRD patterns for $Sr_2EuNb_{1-x}Ti_xO_{6-x/2}$ with x=0.25; the vertical bars indicate the positions of Bragg peaks for this phase (upper bars) and for $Sr_3Ti_2O_7$ (lower bars). In the zoomed region weak peaks of an unidentified impurity phase are indicated by asterisks.

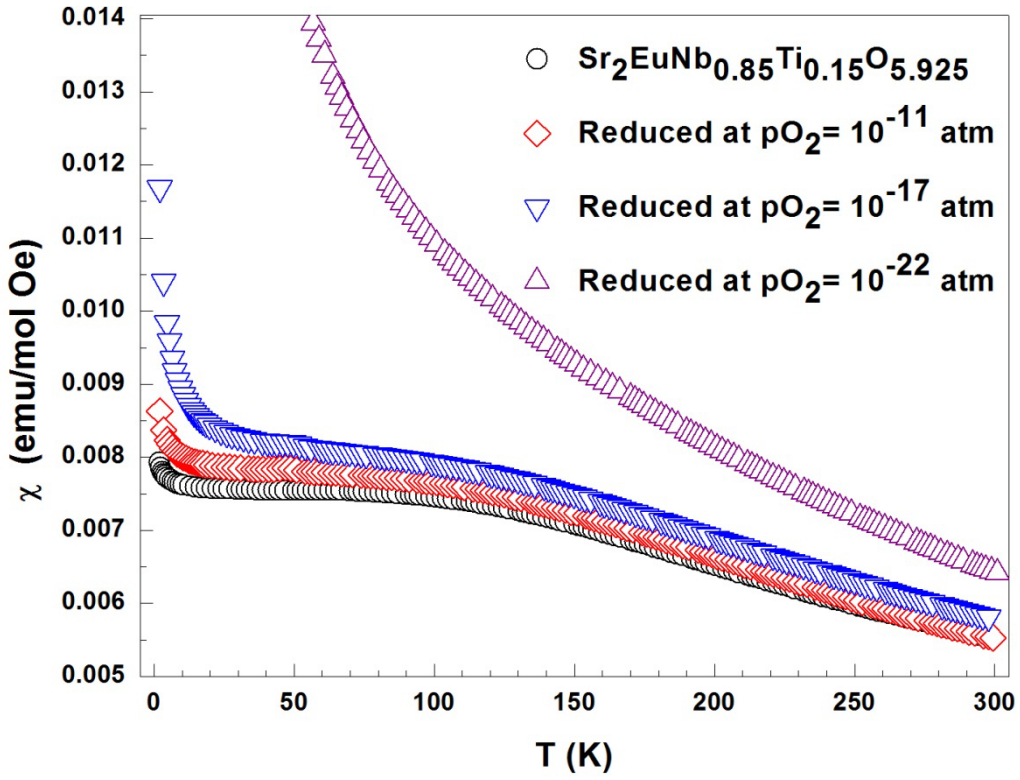

Figure SI 2. Magnetic susceptibility as a function of temperature for as-prepared $Sr_2EuNb_{0.85}Ti_{015}O_{5.925}$ and samples reduced under different pO_2 conditions. As the pO_2 decreases the magnetic susceptibility increases due to the consequent higher Eu^{2+} content in the material.

Table SI 1: Structural parameters for $Sr_2EuNb_{1-x}Ti_xO_{6-x/2}$ ($0 \leq x \leq 0.20$) compounds obtained from XRD.

	[a]Sr_2EuNbO_6	[b]$Sr_2EuNb_{0.95}Ti_{0.05}O_6$	[c]$Sr_2EuNb_{0.90}Ti_{0.10}O_6$	[d]$Sr_2EuNb_{0.85}Ti_{0.15}O_6$	[e]$Sr_2EuNb_{0.80}Ti_{0.20}O_6$
***a* (Å)**	5.8438(2)	5.84134(5)	5.8385(3)	5.8383(4)	5.8393(1)
***b* (Å)**	5.9255(2)	5.91717(5)	5.9028(3)	5.8973(4)	5.8920(1)
c (Å)	8.3072(3)	8.30257(7)	8.2956(5)	8.2895(5)	8.2873(1)
β (deg)	90.216(2)	90.204(1)	90.198(4)	90.193(4)	90.183(1)
Sr position	4e	4e	4e	4e	4e
Occ Sr	1.00	1.00	1.00	1.00	1.00
x	-0.005(2)	-0.005(1)	-0.002(3)	-0.002(3)	0.007(2)
y	0.4654(6)	0.4657(4)	0.4701(6)	0.4712(8)	0.4736(6)
Z	0.2521(9)	0.2507(7)	0.251(1)	0.253(1)	0.249(1)
U*100 (Å^2)	0.70(2)	0.21(2)	0.62(3)	0.76(4)	0.58(3)
Nb/Ti position	2b	2b	2b	2b	2b
Occ Nb/Ti	0.50/0.00	0.473(4)/0.027(4)	0.459(6)/0.041(6)	0.432(5)/0.068(5)	0.420(4)/0.080(4)
U*100 (Å^2)	0.62(4)	0.35(3)	0.71(4)	0.68(5)	0.36(3)
Eu position	2a	2a	2a	2a	2a
Occ Eu	0.50	0.50	0.50	0.50	0.50
U*100 (Å^2)	0.76(4)	0.28(3)	0.68(3)	0.73(4)	0.62(4)
O(1) position	4e	4e	4e	4e	4e
X	0.075(4)	0.095(3)	0.093(5)	0.131(6)	0.104(5)
y	0.0378(4)	0.025(3)	0.036(5)	0.070(5)	0.037(6)
Z	0.261(4)	0.260(3)	0.269(7)	0.261(7)	0.294(6)
Occ	1.00	1.00	1.00	1.00	1.00
U*100 (Å^2)	0.76(3)	0.53(3)	0.82(5)	0.84(4)	0.72(4)
O(2) position	4e	4e	4e	4e	4e
X	0.235(6)	0.231(4)	0.236(7)	0.325(7)	0.222(5)
y	0.308(5)	0.312(3)	0.303(7)	0.308(7)	0.314(6)
Z	-0.034(5)	-0.035(4)	0.021(6)	0.024(6)	-0.033(5)
Occ	1.00	1.00	1.00	1.00	1.00
U*100 (Å^2)	0.76(3)	0.53(3)	0.82(5)	0.84(4)	0.72(4)
O(3) position	4e	4e	4e	4e	4e
X	0.293(5)	0.291(4)	0.286(5)	0.245(7)	0.308(6)
y	0.757(5)	0.776(4)	0.773(6)	0.747(8)	0.793(6)
Z	-0.063(4)	-0.044(4)	-0.084(5)	-0.057(5)	-0.061(6)
Occ	1.00	1.00	1.00	1.00	1.00
U*100 (Å^2)	0.76(3)	0.53(3)	0.82(5)	0.84(4)	0.72(4)

Space Group: $P2_1/n$ (#14): 2a(000), 2b (00½), 4e (xyz),

[a] χ^2= 1.08, R_{wp}= 5.14%, R_{exp}= 4.96%, R_B= 3.10%, Composition: $Sr_2EuNbTiO_6$

[b] χ^2= 1.47, R_{wp}= 4.49%, R_{exp}= 3.70%, R_B= 5.10%, Composition: $Sr_2EuNb_{0.95(2)}Ti_{0.05(2)}O_6$

[c] χ^2= 1.11, R_{wp}= 6.33%, R_{exp}= 6.01%, R_B= 5.57%, Composition: $Sr_2EuNb_{0.92(2)}Ti_{0.08(2)}O_6$

[d] χ^2= 1.18, R_{wp}= 6.17%, R_{exp}= 5.71%, R_B= 5.68%, Composition: $Sr_2EuNb_{0.86(2)}Ti_{0.14(2)}O_6$

[e] χ^2= 1.42, R_{wp}= 5.82%, R_{exp}= 4.88%, R_B= 8.52%, Composition: $Sr_2EuNb_{0.84(2)}Ti_{0.16(2)}O_6$. Some $Sr_3Ti_2O_7$ is also present.

Table SI 2: Selected structural information for as prepared $Sr_2EuNb_{1-x}Ti_xO_6$ ($0 \leq x \leq 0.15$)

	Sr_2EuNbO_6	$Sr_2EuNb_{0.95}Ti_{0.05}O_6$	$Sr_2EuNb_{0.90}Ti_{0.10}O_6$	$Sr_2EuNb_{0.85}Ti_{0.15}O_6$
[a]**Tilt angle θ**	16.5(6)	12.5(5)	13.8(6)	14.7(6)
[b]**Tilt angle φ**	13.5(5)	12.2(5)	11.2(5)	11.5(6)
[c]**Tilt angle μ**	12.2(5)	15.5(6)	15.1(5)	22.0(6)
Tolerance factor	0.9156	0.9160	0.9164	0.9168
[d]**B'-O(1) x 2**	2.09(2)	2.08(2)	2.05(2)	2.13(2)
B'-O(2) x 2	1.96(2)	1.95(2)	1.97(2)	1.83(2)
B'-O(3) x 2	2.00(2)	2.07(2)	2.01(2)	1.93(2)
Average B'-O	2.02(1)	2.03(1)	2.01(1)	1.96(1)
[d]**B''-O(1) x 2**	2.16(2)	2.23(2)	2.25(2)	2.33(2)
B''-O(2) x 2	2.32(2)	2.31(2)	2.26(2)	2.40(2)
B''-O(3) x 2	2.34(2)	2.19(2)	2.27(2)	2.36(2)
Average B''-O	2.27(1)	2.24(1)	2.26(1)	2.36(1)

[a] B'= Nb/Ti, B''= Eu
[b] With [110]; θ = ½ [180-angle<B'-O(3)-B">]
[c] With [1-10]; φ = ½ [180-angle<B'-O(2)-B">]
[d] With [001]; μ = ½ [180-angle<B'-O(1)-B">]