Influence of doping on the transport properties of $Y_{1-x}Ln_xMnO_{3+\delta}$ (Ln: Pr, Nd)

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SUPPLEMENTARY MATERIAL

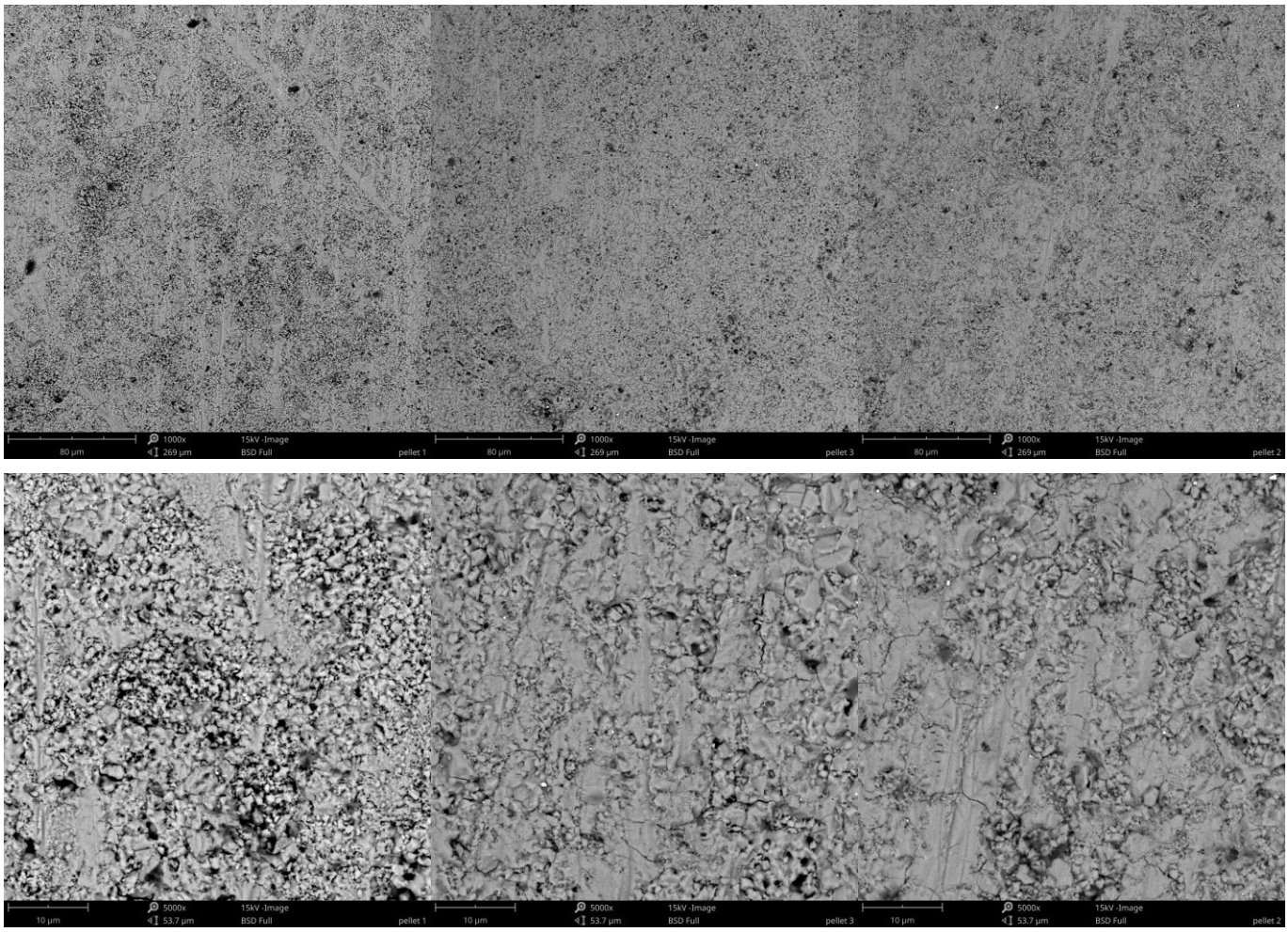

Figure S1. SEM images of the a) $YMnO_3$, b) Nd005 and c) Pr005 pellets reduced at 1000 °C in argon, after electrical conductivity measurements. Magnifications are: 1000x (top) and 5000x (bottom). Significant porosity can be clearly seen for all three samples. Furthermore, numerous cracks can be seen on the surface of Nd005 and Pr005 samples, which is not that significant in $YMnO_3$. This is probably caused by high chemical expansion during oxygen incorporation and extraction into/from materials. As the amount of oxygen incorporated in Nd005 and Pr005 is higher (compared to $YMnO_{3+\delta}$), chemical expansion is also greater and leads to intensified cracking.

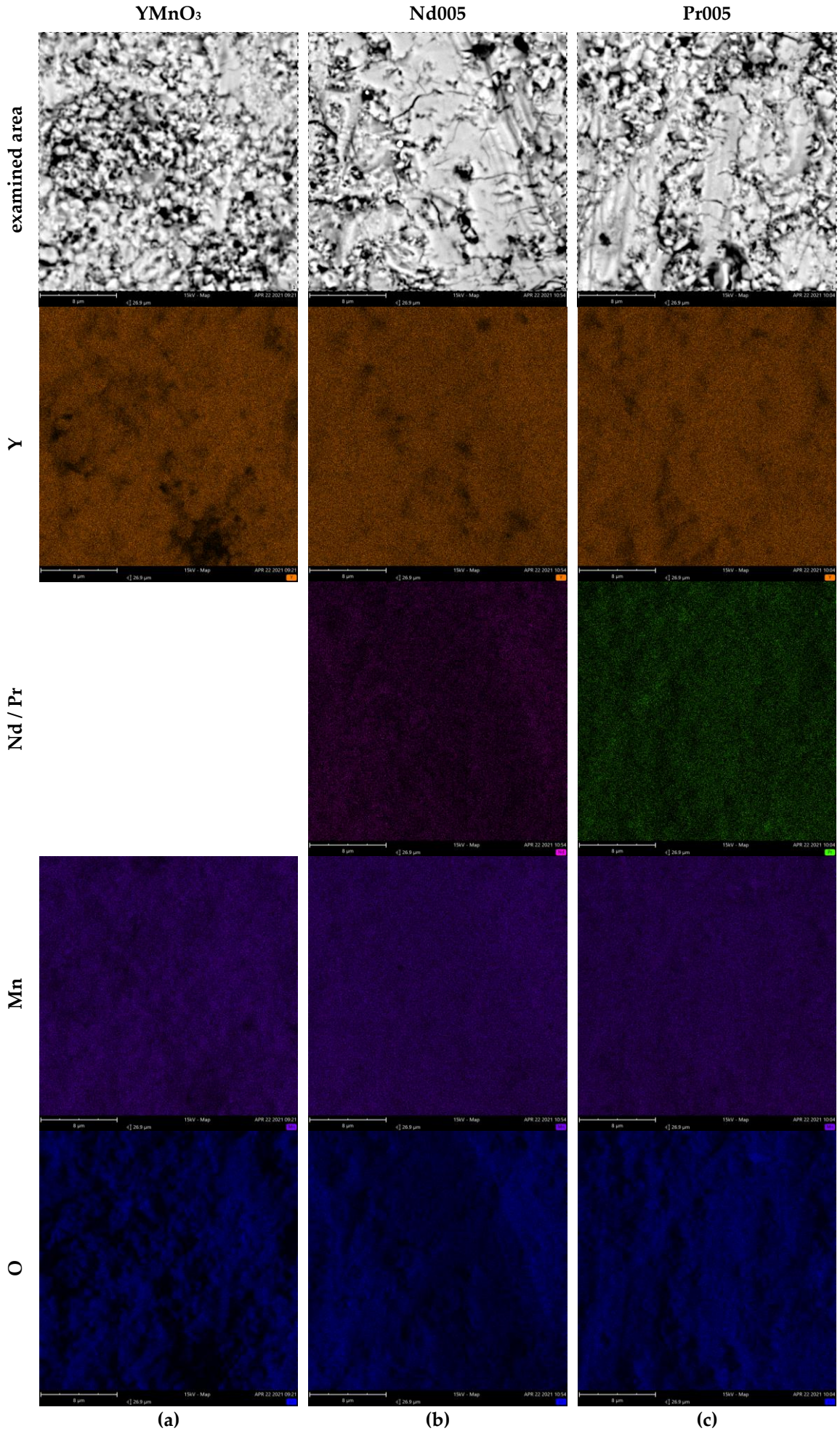

Figure S2. EDS elemental maps of the a) $YMnO_3$, b) Nd005 and c) Pr005 pellets reduced in Ar after electrical conductivity measurements.

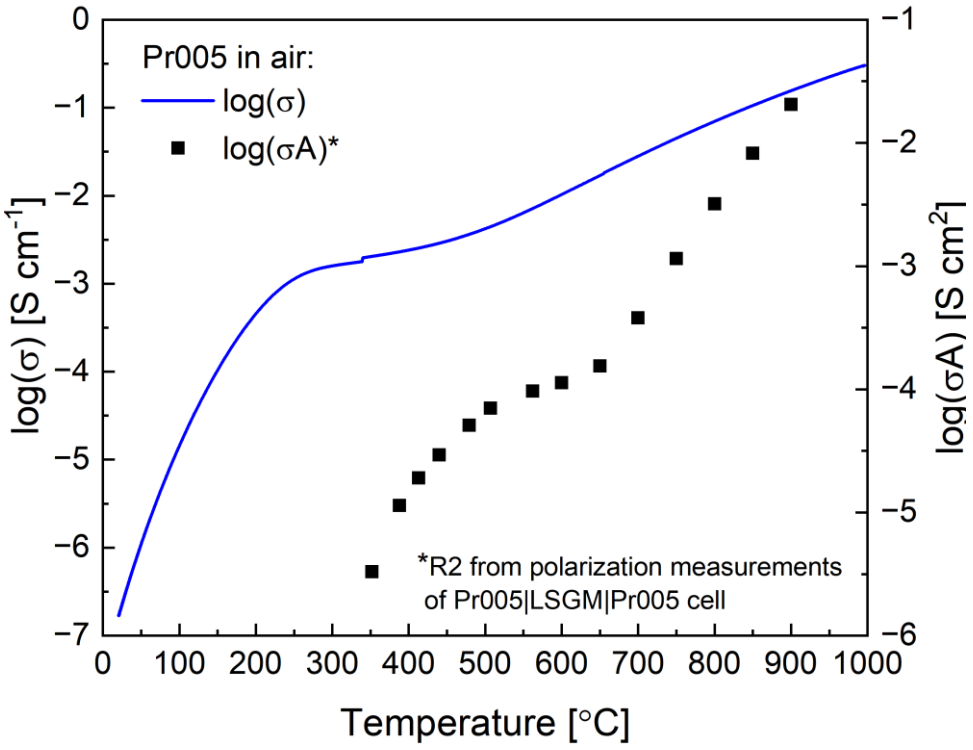

Figure S3. Comparison of conductivity and oxygen content dependencies on temperature, depicted in linear temperature scale.

Table S1. Fitted values of the equivalent circuit elements of the Pr005|LSGM|Pr005 cell. Thickness of LSGM electrolyte: 1.46 mm. Effective surface area of single Pr005 electrode: 27.3 mm^2.

Temperature [°C]	R1 [Ω]	R2a [Ω]	CPE2a-T [S s^P]	CPE2a-P [-]	R2 [Ω]	CPE2-T [S s^P]	CPE2-P [-]
900	3.52	-	-	-	13.78	1.11E-02	0.519
850	4.41	-	-	-	34.39	1.09E-02	0.501
800	5.62	-	-	-	88.48	1.01E-02	0.493
750	7.31	-	-	-	245.8	8.79E-03	0.496
700	9.83	-	-	-	742.7	7.30E-03	0.507
650	14.05	-	-	-	1827	5.71E-03	0.528
600	21.55	-	-	-	2502	4.21E-03	0.558
562	32.33	-	-	-	2930	2.96E-03	0.593
507	69.77	-	-	-	4028	1.73E-03	0.642
479	112.3	-	-	-	5551	1.32E-03	0.664
440	244.9	18.48	3.28E-07	0.922	9656	8.84E-04	0.693
413	428.3	69.19	1.11E-07	0.875	14891	6.86E-04	0.708
388	719.0	271.0	3.02E-08	0.848	24772	5.37E-04	0.719
352	1235	1727	2.95E-09	0.888	*	*	*
328	1564	4545	9.08E-10	0.933	*	*	*
308	1812	10722	4.76E-10	0.957	*	*	*
287	1997	23721	3.26E-10	0.972	*	*	*
259	2124	75046	2.54E-10	0.981	*	*	*

* for the lowest temperatures, error values significantly exceeded 10%, so these were not taken for interpretation of the experiment