Supplementary Information

From "Improvement of transport properties and hydrogen permeation of chemically-stable proton conducting oxides bases on the system $BaZr_{1-x-y}Y_xM_yO_{3-\delta}$" by Sonia Escolástico[1], Mariya Ivanova[2], Cecilia Solís[1], Stefan Roitsch[3], Wilhelm A. Meulenberg[2], José M. Serra[1,*]

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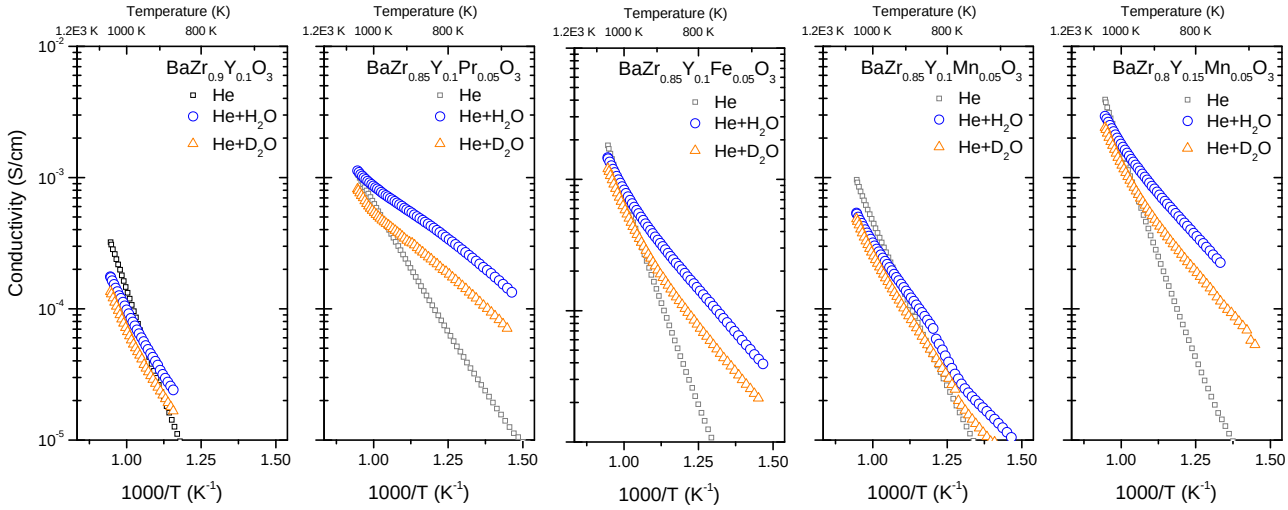

Figure S1: Total conductivity against inverse of temperature in dry helium, helium saturated with water and helium saturated with deuterated water at room temperature of $BaZr_{0.95}Y_{0.1}O_{3-\delta}$, $BaZr_{0.85}Y_{0.1}Pr_{0.05}O_{3-\delta}$, $BaZr_{0.85}Y_{0.1}Fe_{0.05}O_{-\delta\,3}$, $BaZr_{0.85}Y_{0.1}Mn_{0.05}O_{3-\delta}$, $BaZr_{0.8}Y_{0.15}Mn_{0.05}O_{3-\delta}$.

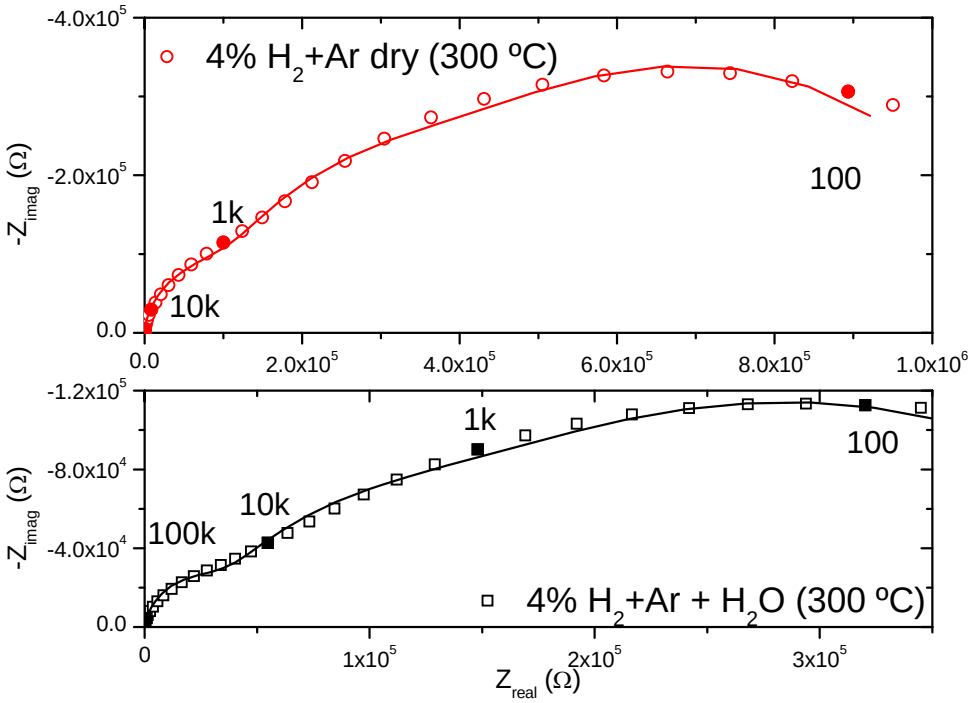

Figure S2 shows impedance spectra of the $BaZr_{0.8}Y_{0.15}Mn_{0.05}O_{3-\delta}$ sample, recorded at 300 ºC in 4% H_2+Ar in dry (top) and wet (bottom) atmospheres. The open symbols represent the experimental data and lines the fits to a model with three in serie RQ elements. The three different contributions, observed at different frequencies, can be associated to different processes: (1) the high frequency semicircle (200-500 kHz) can be associated to the bulk resistivity (pseudo-capacitances of 5.9-6.0 x 10^{-11} F); (2) a second high frequency contribution but lower frequencies than the first one (12-25 kHz) with pseudo-capacitances of 2.8-4.4 x 10^{-10} is not easily associated to any specific process; and (3) the intermediate frequency arc (1.05-1.36 kHz) associated to the grain boundaries resistivity (pseudo-capacitances of 1.0-2.8 x 10^{-9} F). The most important contribution to the total sample resistance is the one related to grain boundary transport. Similar values of bulk and grain boundaries associated pseudo-capacitances have been observed by Ricote et al. [25, 26] for $BaZr_{0.9}Y_{0.1}O_{3-\delta}$ in 9% H_2+N_2+H_2O at 370 ºC.