Catalytic Surface Activation of Oxygen Transport Membranes

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Oxygen transport membranes (OTM) based on mixed ionic–electronic conducting (MIEC) oxides allow the selective oxygen separation at high temperature, which could be integrate in oxyfuel power plants and in the chemical industry. The principle of oxygen separation through this kind of membranes is the ambipolar diffusion of electrons/ holes and oxide ions/vacancies through the metal oxide lattice. Consequently, a gastight MIEC membrane allows theoretically achieving an infinite selectivity. If the membrane thickness and the material diffusivity are sufficiently high, bulk transport is not the unique limiting transport. Typically, bulk oxygen ionic diffusion and surface exchange steps are particularly important but other important limitations could appear due to gas concentration polarization in the module compartment and in the porous structures of the membrane. In this presentation, we discussed on the possible permeation limitations and focused on the development of catalytic surface activation, which enables to increase substantially the permeation of thin supported membranes when other external limitations are minimized.

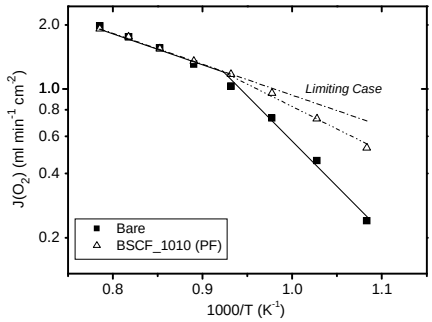

Figure 1. Temperature dependence of oxygen permeation flux through catalytic MIEC membranes. QAr = 65 ml/min, QAir = 60 ml/min (pO_2=0.21).

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