

# La-ferrite Oxygen Separation Membranes Produced by Thermoplastic Extrusion

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## Abstract

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Swiss Federal Laboratories for Materials Testing and Research, Laboratory for High Performance Ceramics, Dübendorf, Switzerland. Abstract: By using thermoplastic extrusion method, tubular oxygen separation membranes can be produced from perovskite powders. La-ferrite perovskite powders such as  $\text{La}_{0.8}\text{Ca}_{0.2}\text{Fe}_{1.01}\text{O}_{3-d}$  and  $\text{La}_{0.6}\text{Ca}_{0.4}\text{Fe}_{0.75}\text{Co}_{0.25}\text{O}_{3-d}$  were produced by spray-pyrolysis and solid state reaction routes. Phase purity was checked by X-ray diffraction. The as-prepared perovskite powders were mixed in a high-shear mixer with a thermoplastic binder system, which contained low viscosity wax and low density polyethylene. Feedstocks with different volume percentages of perovskite powder were investigated by using torque and capillary rheometers before extruded with a single screw extruder. Extruded perovskite tubes were sintered at different temperatures. Tubes sintered on V-shaped  $\text{Al}_2\text{O}_3$  supports at  $1300^\circ\text{C}$  for 4h showed the highest density. The permeation properties of the  $\text{La}_{0.6}\text{Ca}_{0.4}\text{Fe}_{0.75}\text{Co}_{0.25}\text{O}_{3-d}$  tubes were measured in an air/argon  $\text{pO}_2$  gradient as a function of temperature. At  $900^\circ\text{C}$ , the oxygen flux through a sintered tube with an outer diameter of 4.9 mm and a wall thickness of 250  $\mu\text{m}$  thick tube was  $0.24 \text{ mmol/cm}^2\text{s}$ .