Influence of pore former on porosity and mechanical properties of Ce0.9Gd0.1O1.95 electrolytes for flue gas purification

Single layered porous Ce0.9Gd0.1O1.95 electrolytes were fabricated by tape casting using different types, shapes and sizes of pore formers and their respective strength and stiffness were compared. The sintered bodies were characterized by scanning electron microscopy, mercury porosimetry, impulse excitation technique (Young modulus) and flexural strength measurements, to investigate the role of the different pore formers on the properties of the compounds. The compared techniques used to evaluate porosity give consistent results. The ratio between open and total porosities, evaluated from mercury porosimetry, varies depending on the used pore formers. The stiffness and strength of the compounds show an exponential dependency to the total porosity. By considering the open porosity instead (functional porosity), we observe that samples with platelets shaped pore formers have higher in-plane strength than spherical pore formers. An optimum can be found in term of Weibull strength and strain of samples obtained with the various pore formers by considering the dependency on the functional open porosity instead of the total porosity.

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