

BaCe_{0.9}Y_{0.1}O_{3-α}固体电解质的离子导电性

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摘要 用交流复阻抗法测定了混合离子(质子+氧离子)导电性固体电解质BaCe_{0.9}Y_{0.1}O_{3-α}在600~1000℃下不同气氛(干燥空气、湿润空气及湿润氢气)中的电导率;通过测定总电导率(离子电导率+电子电导率)随气氛中氧分压 p_{O_2} 变化,

求得离子电导率和离子迁移数;用氢浓差电池方法测得氢气中的质子迁移数。结果表明, BaCe_{0.9}Y_{0.1}O_{3-α}固体电解质在氧分压<10Pa的气氛(如氢气)中几乎为纯离子导体,而在氧分压为 $10\sim 10^5$ Pa的气氛(如空气)中为离子和电子空穴混合导体;样品在各气氛中的离子电导率均高于 $10^{-2}S\cdot cm^{-1}$ 。

关键词 [氧化钇](#) [氧化钡](#) [氧化铈](#) [电解质](#) [导电性](#) [钙钛矿型结构](#) [导体](#)

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Ionic conduction in BaCe_{0.9}Y_{0.1}O_{3-α} solid electrolyte

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Abstract The ionic conduction in mixed ions (proton and oxide ion)-conducting solid electrolyte, BaCe_{0.9}Y_{0.1}O_{3-α}, has been studied by complex impedance analysis method and H₂ concentration cell technique over the temperature range from 600 °C to 1000 °C. The ionic transport numbers (t_i) of BaCe_{0.9}Y_{0.1}O_{3-α} under different atmospheres were determined by studying the dependence of total conductivity on oxygen partial pressure, p_{O_2} , and by measurement of the EMF of H₂ concentration cell. At low oxygen partial pressure (<10 Pa), BaCe_{0.9}Y_{0.1}O_{3-α} was almost a pure ionic conductor ($t_i \approx 1$), whereas at high oxygen partial pressure ($10\sim 10^5$ Pa) it exhibits a mixed ionic and p-type electronic conduction ($t_i < 1$). The ionic conductivity values determined under different atmospheres are higher than $10^{-2} S\cdot cm^{-1}$. The high ionic conductivity under various atmospheres and high ionic transport number at low oxygen partial pressure suggest that BaCe_{0.9}Y_{0.1}O_{3-α} might be a satisfactory candidate for various electrochemical devices.

Key words [YTTRIUM OXIDE](#) [BARIUM OXIDE](#) [CERIUM OXIDE](#) [ELECTROLYTE](#) [ELECTRICAL CONDUCTIVITY](#) [PEROVSKITE TYPE STRUCTURE](#) [CONDUCTORS](#)

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