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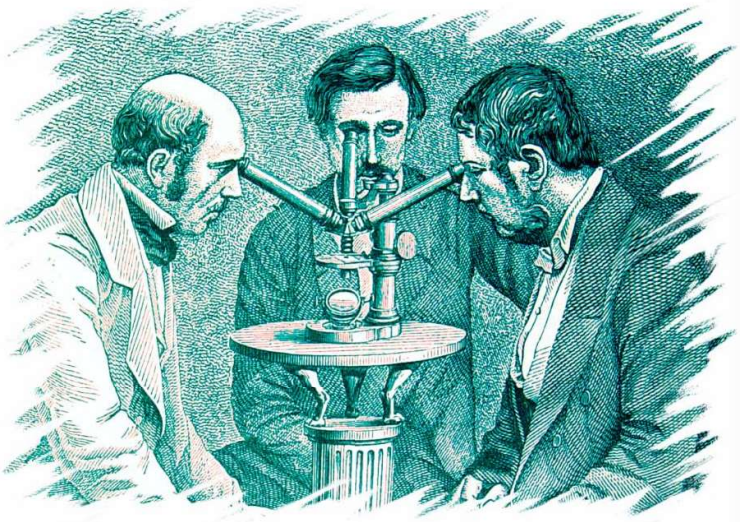

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AQUEOUS SOL-GEL METHOD

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Fuel cells efficiently convert chemical energy to electricity in a silent and environmentally friendly way. Among the various kinds of fuel cells, solid-oxide fuel cells (SOFCs) have the advantages of the highest energy conversion efficiency and excellent fuel flexibility because of their high operating temperature. The high working temperature necessary to make oxide ions mobile enough in the electrolyte (e.g. 1273K for stabilized zirconias). Such a high operating temperature is beneficial for improving the electrode reaction kinetics and reducing the electrolyte ohmic drop [1]. Such conditions have some drawbacks like as seal in high temperature, interface reaction between components of SOFC, the sintering of the electrodes and more [2]. This operating temperature could be lowered by reducing the current electrolytes thickness or by finding more efficient electrolytes [3]. Recently, the new family of fast-oxide ion conductors whose parent compound is $La_2Mo_2O_9$ was discovered. This material high conductivity is associated with a phase transition from the room-temperature monoclinic α-form to a high-temperature cubic β-form at 853K while increasing oxygen ion conductivity of almost two orders of magnitude [4]. On purpose, to stabilize cubic phase at room temperature, lanthanum molybdate could be doped by different elements in the La, Mo, and O sites. It was observed that La site substitution with lower valence cations such as Ca^{2+}, Sr^{2+}, Ba^{2+} and another could stabilize cubic phase and increase oxygen-vacancy concentration [5, 6]. Moreover, oxygen ion transport properties strongly depends on preparation methods. To eliminate impurities, porosity and other drawbacks it is important to choose the right synthesis method, starting materials and reaction conditions, which could influence these disadvantages. In this paper, the aqueous sol-gel synthesis was successfully used to synthesize lanthanum molybdate doped by calcium with the initial composition of $La_{1.9}Ca_{0.1}Mo_2O_{8.95}$. Tartaric acid and citric acid was used as chelating agents. The synthesized gel precursors were heat-treated at 1273K for 5 h. The obtained powders were additionally pelletized and sintered in air at 1473 K for 5 h. To investigate thermal decomposition and possible mechanism of synthesised ceramics thermogravimetric analysis and differential scanning calorimetry (TGA-DSC) were carried out. For crystal structure determination X-ray diffraction (XRD) analysis was performed. Moreover, the influence to the resulting surface morphology of different chelating agent, starting materials and amount of dopant was investigated using the scanning electron microscopy (SEM).

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