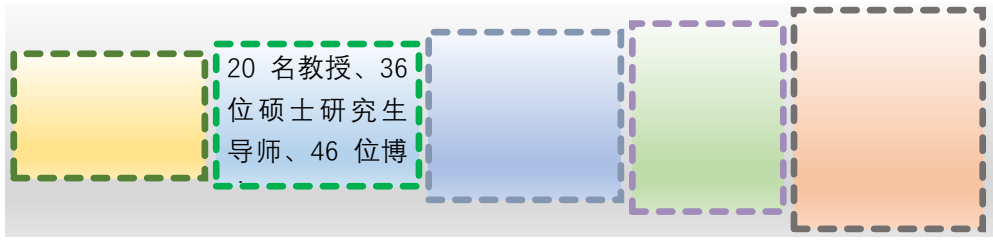
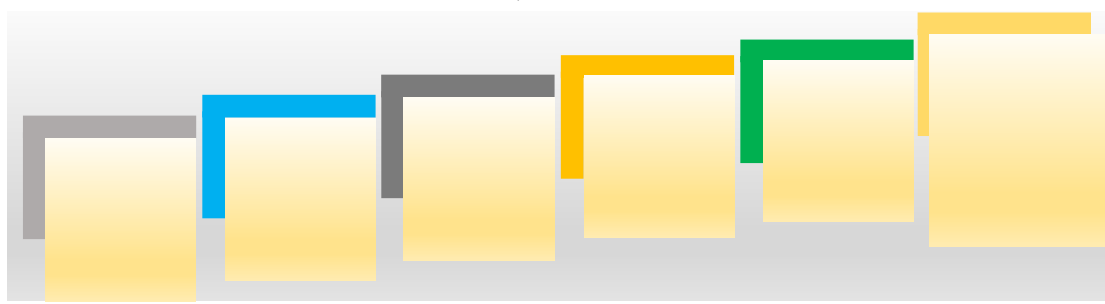


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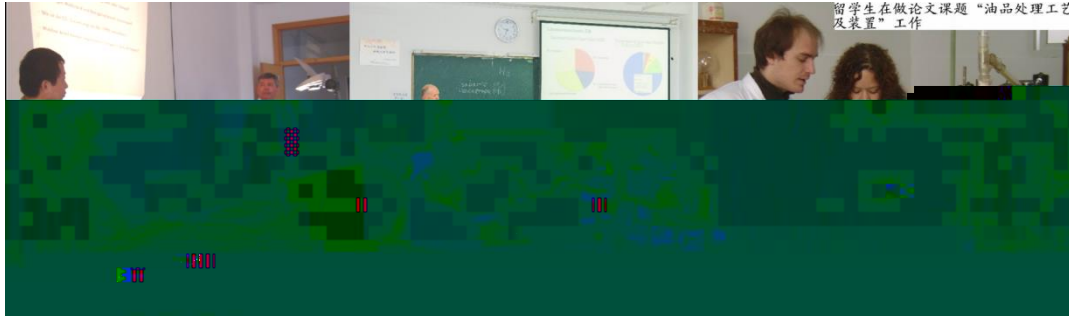
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留学生在做论文课题“油品处理工艺及装置”工作

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**Preparation and characterization of  $\text{Cu}_2\text{V}_2\text{O}_7\cdot x\text{H}_2\text{O}$  as electrolyte for intermediate temperature solid oxide fuel cells**  
Bida Ji <sup>a,b</sup>, Changan Tian <sup>a,c</sup>, Chuanyang Wang <sup>a,c</sup>, Tong Wu <sup>a</sup>, Jinrong Xie <sup>a</sup>, Minghua Li <sup>a</sup>

**HIGHLIGHTS**

- Single phase ultrathin  $\text{Cu}_2\text{V}_2\text{O}_7\cdot x\text{H}_2\text{O}$  powder have been synthesized.
- The synthesized powder exhibited high ionic activity.
- $\text{Cu}_2\text{V}_2\text{O}_7\cdot x\text{H}_2\text{O}$  has the highest ionic conductivity.

**ARTICLE INFO**

**ABSTRACT**

In this study, ultrathin  $\text{Cu}_2\text{V}_2\text{O}_7\cdot x\text{H}_2\text{O}$  (for  $x = 0.99$ , 0.94, 0.98, 0.92, 0.96, 0.97) powders have been successfully prepared by an ionic exchange method. The synthesis was characterized by XRD, TEM, IR, SEM, EDS, and TGA. The results indicate that  $\text{Cu}_2\text{V}_2\text{O}_7\cdot x\text{H}_2\text{O}$  powders with highly phase pure oxide. X-ray diffraction patterns were observed after calcining at 500 °C for 2 h. The average crystallite sizes were between 11.3 and 17.9 nm. The synthesized powders exhibited high ionic activity.  $\text{Cu}_2\text{V}_2\text{O}_7\cdot x\text{H}_2\text{O}$  ceramic electrolytes exhibit high ionic conductivity above one  $10^{-2}$  S cm<sup>-1</sup> when sintered at 1200 °C for 4 h.  $\text{Cu}_2\text{V}_2\text{O}_7\cdot x\text{H}_2\text{O}$  ceramic electrolyte sintered at 1200 °C for 4 h exhibits the highest ionic conductivity ( $\sigma_{\text{ion}} = 0.029$  S cm<sup>-1</sup>, based electrical activation energy  $E_a = 0.25$  eV) and moderate thermal expansion coefficient ( $10^{-5}$ – $13.5 \times 10^{-7}$  K<sup>-1</sup>) between 30 and 800 °C. Therefore, it was concluded that coupling with appropriate rates of VCO can further improve the properties of ceramic electrolytes.

**1. Introduction**

Solid oxide fuel cells (SOFCs) are electrochemical devices that can transform chemical energy directly into electrical energy and much effort is being given for being devoted to the development and application of SOFCs due to their high conversion efficiency, environmental friendliness, and absence of pollutants.

**Keywords:**  
SOFCs; electrolyte; ceramic oxides; oxygen ion conductivity; SOFCs; ceramic electrolytes; ceramic oxides

证书号 1994290 号

**发明专利证书**

发明名称: 有机-无机杂化的多相氧化物基材料及其制备方法

发明人: 张金钟, 张雷, 柯光中, 汪洪兴, 潘红真

专利号: ZL 2014 1 028979.6

专利申请日: 2014年03月26日

专利权人: 合肥学院

授权公告日: 2016年03月23日

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**荣誉证书**  
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第九届全国大学生化工设计竞赛

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