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研究论文

压电材料对含铂活性炭氢气吸附性能的影响

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摘要: 用机械混合法制备含有不同质量分数铂的活性炭, 研究了压电材料PMN--PT产生的电荷对含铂活性炭氢气吸附性能的影响。结果表明, 在高压氢气条件下PMN--PT产生的电荷能增强铂和活性炭颗粒对氢气分子的吸附, 并加速氢气分子的解离和氢原子的扩散, 使含铂活性炭的储氢量明显提高。铂产生的氢溢流作用有效地提高了活性炭的氢气吸附量。在室温和8 MPa氢气压力条件下PMN--PT使活性炭(NAC)氢气吸附量产生的增长幅度为15%, 使含有质量分数0.83%、1%和1.25%铂的活性炭氢气吸附量增长的幅度分别为36.5%、39.3%和43.9%。

关键词: 无机非金属材料 活性炭 氢气吸附 氢溢流作用 压电材料

Influence of Piezoelectric Element on Hydrogen Adsorption of Pt--supported Activated Carbon

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Abstract: Mixing Pt--coated activated carbon with secondary activated carbon as adsorbent was used for hydrogen storage. Behaviors of hydrogen adsorption on Pt--supported activated carbon in the presence of a piezoelectric element were investigated. Hydrogen storage in activated carbons can be increased by secondary hydrogen spillover from a supported Pt catalyst. The piezoelectric element is able to autogenously generate charges in hydrogen pressure. The observed adsorption enhancements of NAC, Pt/NAC--1, Pt/NAC--2 and Pt/NAC--3 are 15%, 36.5%, 39.3% and 43.9%, respectively. The greater enhancement observed from hydrogen adsorption on Pt/NAC samples can be attributed to charges generated by PMN--PT facilitate dissociation of hydrogen molecules into hydrogen atoms. The easier accessibility of the atomic orbital might favor the electron transfer from the atomic hydrogen to charged carbon.

Keywords:

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