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铁酸镍用于热化学循环反应CO_2分解制CO的研究

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CO production via thermochemical CO_2 splitting over Ni ferrite-based catalysts

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摘要 采用共沉淀法制备了$NiFe_2O_4$和$NiFe_2O_4/ZrO_2$催化剂，用TGA考察了其热化学法，CO_2高温分解反应性能。通过对反应前后催化剂的表征发现，反应高温使两种催化剂都发生了明显的烧结，导致在热还原反应中形成的还原态氧化物不能完全被CO_2氧化从而降低了催化剂的反应性能；ZrO_2的加入对于提高催化剂的热稳定性以及循环反应稳定性具有重要的作用。在高温反应炉中考察了$NiFe_2O_4/ZrO_2$的CO_2分解实验，结果表明，提高热还原温度可以提高CO产量，然而，随着循环次数的增加CO的产量降低得更明显。

关键词： 热化学循环反应　二氧化碳分解　一氧化碳制备　铁酸镍

Abstract: The thermochemical CO_2 splitting activity of $NiFe_2O_4$ and $NiFe_2O_4/ZrO_2$ prepared by the conventional co-precipitation method was investigated with thermogravimetric analysis (TGA) technique. Significant sintering was observed over the two samples during cyclic reactions because of the high reaction temperature. This would lead to an incomplete re-oxidation of the reduced sample in the CO_2 splitting reaction. Introduction of ZrO_2 could greatly enhance the thermal stability of $NiFe_2O_4$, and hence, the cycling behavior in repeated cycles. The catalytic results of $NiFe_2O_4/ZrO_2$ for cyclic splitting of CO_2 in a high-temperature furnace indicate that CO productivity increased with the thermal reduction temperature, while the cycling stability severely decreased with the cyclic number.

Key words: thermochemical cyclic reactions　CO_2 splitting　CO production　nickel ferrite

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