Thermochemical Water Splitting by using Ferrites

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The thermal behavior of $NiFe_2O_4$ prepared by a solid-state method was investigated for H_2 production by the thermochemical cycle. The reduction reaction of $NiFe_2O_4$ started from 600℃, and the weight loss was 1.1 wt% up to 1200℃. At this reaction, $NiFe_2O_4$ was reduced by release of oxygen bonded with the Fe^{3+} ion in the B site of $NiFe_2O_4$. In the H_2O decomposition reaction, H_2 was produced by oxidation of reduced $NiFe_2O_4$. $NiFe_2O_4$ produced H_2 volume of 0.5cm^3/g a cycle on an average. The spinel structure of $NiFe_2O_4$ was confirmed by XRD study, which was maintained during redox reaction. Then, $NiFe_2O_4$ is excellent material in the thermochemical cyclic reaction due to release oxygen at low temperature for the reduction reaction and due to produce H_2 maintaining crystal structure for redox reaction.