

Hydrogen Production from Water with Biomass as Reductants

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Abstract:

Our current energy infrastructure is dominated by fossil fuels which are being depleted. Considerable efforts are always under way to search for an alternative to fossil fuels. Hydrogen is considered as a nonpolluting, efficient, inexhaustible energy carrier to alternate fossil fuels for the future. When hydrogen combines with oxygen, only water is formed as the reaction product. Water is our most abundant resource, and thus, the hydrogen production from water has attracted much more attention than that from the other primary sources, such as natural gas, heavy oil, methanol, biomass, wastes and coal, etc. However, the challenges remain for production hydrogen from water by efficient methods in low energy cost.

High-temperature water (HTW) is a promising new medium due to its environmentally benign nature and feasibility in the adjustment of solvent characters. The hydrogen bonding in water becomes weaker and less persistent with increasing temperature and decreasing density in HTW. Furthermore, HTW exhibits an increasing solubility toward organic compounds. Individual water molecules can actively participate in the reaction as reactants or as catalysts.

This presentation will introduce an innovation method for producing hydrogen from water with biomass or organic waste as a reductant, which can be converted into value-added products, at mild hydrothermal conditions.

Keywords:

Hydrogen; hydrothermal reactions; biomass; renewable energy; sulfur