

# Solutions to the Global Energy Crisis: Development of extremely fast preparation method for hydrogen storage materials from plastic waste and biomass using microwave-induced plasma

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**Submission Category:** (A) Technical research proposal to solve concrete problems

## **SDGs Targets/Indicators:**

This research proposal aims to achieve SDG Goals: (7) Energy, (9) Infrastructure, industrialization, (12) Sustainable consumption and production, and (13) Climate Change.

## **Abstract:**

Energy is necessary for every human being. More than 70 percent of global energy consumption come from fossil fuel, which emit gigantic amount of CO<sub>2</sub> and make climate change situation become worst. Therefore, hydrogen has been considered as an alternative and clean energy because it does not cause CO<sub>2</sub> emission and can be obtained from renewable energy resource like water. To make hydrogen become practical energy resource, development of adsorptive materials with high hydrogen storage capacity is necessary. This research proposal is seeking for an effective preparation method to prepare material for hydrogen storage application. This research proposal suggests preparing material for hydrogen storage by microwave-induced plasma with KOH activation. The resultant materials show high specific surface area of 1007, 1888, 2084 m<sup>2</sup> g<sup>-1</sup>, which were obtained within 80, 270, 330 s. The specific surface area is a key factor for hydrogen storage capacity. It is remarkable that the investigated method can reduce the activation time by one to two order of magnitude in comparison to conventional thermal activation. These results can be used to design continuous reactor system to realize energy sufficiency in industrial scale. In this research, plastic waste and biomass residual are used as feedstock to produce material for hydrogen storage application. Use of waste and renewable resource can reduce natural resources use and make the production process become more sustainable. This research proposal introduces new ideas to reduce CO<sub>2</sub> emission, and increase energy sufficiency in industrial process. The proposed ideas can be one of supports to combat climate change.