



# University of Central Florida

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## Organic Catalyst for Higher Rate of Hydrogen Generation & Efficient Solid-State Storage

*A method for controlling the generation of hydrogen gas from a metal borohydride solution with organic pigment catalysts*

A comparably priced but more active catalyst in the process to solidify hydrogen that overcomes its significant barrier to automotive adoption is a move toward sustainability, environmental protection, and energy independence. Storing hydrogen safely and efficiently must be accomplished before it can be a widespread, mainstay fuel source, because it is a gas in standard conditions.

Based on the simple molecular gas  $H_2$ , this domestic and environmentally “green” fuel must be stored on-board a vehicle in heavy, pressurized cylinders that are difficult to carry as a supply when traveling relatively far. When stored as a solid, hydrogen could overthrow refined petroleum fuel as the source to power the market of over 1 billion cars worldwide. A route to overcoming this, by converting  $H_2$  to its solid state, relies significantly on catalysts in the process of  $H_2$  generation from a borohydride solution. Conventional catalysts are often inorganic metallic powders that are not as active as a newly invented organic catalyst that offers a higher rate of hydrogen generation at a comparable cost.

### Technical Details

A method using the organic pigment catalyst, the critical aspect of this technology, calls for immersing the catalyst in borohydride solution for a controllable rate of on-board hydrogen gas generation for fuel cells or combustion engines, primarily in vehicles. These catalysts accelerate the reaction by acting as an oxidizing agent toward the borohydride ion and a reducing agent of the production of hydrogen. With this type of catalyst,  $H_2$  generation from a borohydride solution can be accomplished with readily available materials, versatility, reliability, and accuracy. The new way of hydrogen release enables accurate and economical material and fuel consumption.

### UCF Inventors

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### Benefits

- Higher rate of hydrogen generation
- Safe and effective hydrogen storage
- On-board and on-demand usefulness
- Supports environmentally sustainable fuel

### Applications

- Hydrogen-fueled applications

### Tech Field

Hydrogen Fuels

### Keywords

hydrogen, fuel cell, combustion engine, borohydride, transportation, catalysts, pigments, clean energy, automotive, vehicles

### US Issued Patent

7,722,853 B2

**If you or your company are interested in this opportunity, Contact:**

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