



## **SINCEM 2016 doctoral research subject**

### **Photocatalytic production of chemicals and H<sub>2</sub> from biomass**

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**HOST INSTITUTION 2: ISTECCNR, Italy;** Supervisor Dr. Alessandra Sanson.

#### **PROJECT DETAILS:**

Upgrade of biomass to valuable chemicals is a central topic in modern research due to the high availability and low price of this feedstock. For the difficulties in biomass treatment, different pathways are still under investigation. A promising way is in the photo-conversion, because it can lead to greener transformation processes with the use of solar light as a renewable resource. Solar photons can be considered the ideal green reagents since they are costless and leave no residue in the reaction mixture. In many cases, the solar radiation could be successfully used in place of toxic or expensive chemical reagents to overcome the activation energy in organic synthesis.

Hydrogen is a clean energy carrier, and it can be produced via different processes using fossil fuels and biomass-derived materials. An attractive solution for H<sub>2</sub> production from biomass is the use of photocatalysis. Indeed, upon photoactivation in the presence of an appropriate semiconductor, biomass can form H<sub>2</sub> and undergo selective oxidation to carbon-containing by-products.

The PhD work will deal with a comprehensive study on the efficiency of different photocatalysts in the production of H<sub>2</sub> and high value molecules from biomass-derived compounds. Both photoreforming processes for H<sub>2</sub> production and oxidation reactions for synthesis of chemicals from renewable will be investigated.

The student will work with a combination of innovative methods for semiconductor synthesis and characterisation; moreover, the prepared materials will be tested in appropriate laboratory-scale test reactions.