UNIVERSITÀ DEGLI STUDI DI MILANO

SEMINARI CHIMICI

Data ***Giovedì 16 Aprile 2015, ore 14:30***
Aula 403, Settore Didattico Celoria, via Golgi 19

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Titolo**:** ***Four Decades of Heterogeneous Photocatalysis: Where are the much promised Solar Fuels?***

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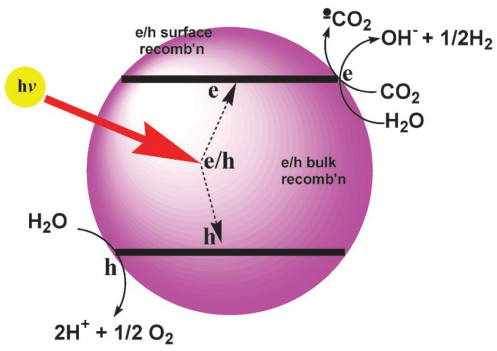
The two oil crises of the 1970s led to the search for renewable energy sources, with water splitting as the principal source of H_2 subsequent to a short article by Fujishima and Honda (*Nature*, 1972) that started a frenzy research activity. The use of water as a fuel was predicted nearly 140 years ago by Jules Verne (The Mysterious Island, 1874). Though many strategies have been proposed and some experimented with, it became clear that a process occurring in heterogeneous media might likely achieve the desired results through the intermediacy of semiconductor-based photocatalysts. Studies of Heterogeneous Photocatalysis toward environmental remediation and in the generation of useful fuels from the reduction of H_2O (to H_2) and carbon dioxide (to CH_3OH, CO, and/or CH_4) have been carried out largely in the last four decades. Separation of photogenerated charge carriers (electrons and holes) was crucial in any successful attempt at producing solar fuels. Though water splitting has been achieved, the quantity of H_2 produced remains disappointingly low and this even in the presence of a sacrificial electron donor. Although results are disappointing, much has been learned in new nanomaterials. The ***Holy Grail*** photocatalysts to achieve significant water splitting and reduction of the Greenhouse gas, CO_2, have yet to be discovered.



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