

**Ph.D. Course in Materials Science and Nanotechnology**  
University of Milano-Bicocca, Department of Materials Science, via Cozzi 55, 20125 Milano

**September 23, 2015 – 11.00 a.m.**  
**Seminar room - Department of Materials Science U5**

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## **Electron-Hole Recombination Controlled by Doping Sites in Sr-doped NaTaO<sub>3</sub>**

Photocatalytic splitting reaction of water is one of the promising processes for hydrogen fuel production. The photocatalysts La-doped NaTaO<sub>3</sub> and Zn-doped Ga<sub>2</sub>O<sub>3</sub> have the highest quantum efficiency for water splitting. Compatible activities have also been achieved by using NaTaO<sub>3</sub> doped with alkaline-earth metals, Ca, Sr, and Ba. Hence, doping with heterometals is the key to producing hydrogen fuel efficiently. Our earlier studies revealed using time-resolved infrared absorption that the favorable metal doping to NaTaO<sub>3</sub> restricted electron-hole recombination and enhanced the quantum efficiency as a result. Specific metal elements, despite being impurities in the host lattice, restrict recombination, but the mechanisms of this restriction are still unknown. In this study, we show that Sr<sup>2+</sup> cations restricted electron-hole recombination and increased the steady-state population of photoexcited electrons by 180 times when used to simultaneously dope the A sites and B sites of perovskite-structured NaTaO<sub>3</sub>. The same element failed to restrict recombination when used to dope the A sites alone.

PhD students and all interested in the seminar are kindly invited to participate.

The PhD Coordinator  
Prof. Gianpaolo Brivio