

## The International Debate on Preparation of Mg-Doped TiO<sub>2</sub> Nanoparticles for Dye-Sensitized Solar Cell Applications

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**D**ye-sensitized solar cell (DSSCs) is the third-generation of solar cells based on semiconductors formed between a photo sensitized anode and counter cathode which make a photo electrochemical system. They have not been commercially marketed due to their lower efficiency than the previous generations. In order to achieve the higher efficiency, the electron injection and light absorption must be increased. One way to increase electron injection is doping the semiconductor with an external ion to reduce lattice band gap. In this work, we made powder and Nano-structured film of titanium dioxide doped with various molar ratios of Mg by the sol-gel process. The effect of Mg:Ti molar ratio on characteristics of deposited films and fabricated DSSCs was investigated by different analyses such as XRD, SEM,

UV-vis. The XRD analysis shows that no magnesium oxide was detected. Furthermore, SEM images display that all films have uniform and homogeneous structure with particles around 15-20 nm. The UV-vis analysis indicate that magnesium-doped TiO<sub>2</sub> have higher visible light absorption than pure TiO<sub>2</sub>. Measuring the band gap energy by DRS analysis shows that by Mg-doped TiO<sub>2</sub> the band gap energy decreased about 0.1 eV and also the efficiency increased from the pure TiO<sub>2</sub>. The maximum efficiency achieved 3.71%.

### Biography

Mahtab Safaei is graduated in Master of Science in material science-nanotechnology from Sharif University in year 2016 at the age of 26.