## Essential role of N and Au on TiO2 as photoanode for efficient dye-sensitized solar cells

## ABSTRACT

We firstly report on the successful application of a gold nanoparticles deposited nitrogen doped-titania (Au/N-TiO2) nanocomposite as an efficient photoanode for highly efficient dye-sensitized solar cells (DSSC) with the standard photosensitizer, N719 dye. The Au/N-TiO2 nanocomposites with different Au contents are prepared using a simple chemical reduction method and characterized using various analytical techniques. The DSSC assembled with the Au/N-TiO2 modified photoanode demonstrated an enhanced solar-to-electrical energy conversion efficiency of 7.90% compared to the photoanode of a DSSC composed of bare TiO2 (2.55%) under full sunlight illumination (100 mW cm 2, AM 1.5G). This enhanced efficiency is mainly attributed to the doping of N and deposition of Au NPs on the TiO2 surface as a resultant of reduction in the band-gap energy, plasmonic effect improved interfacial charge transfer process and minimized charge recombination. The influence of Au content for N-TiO2 is found to be 10 mM. The enhanced solar energy conversion efficiency demonstrated by the Au/N-TiO2 nanocomposite makes it a promising alternative to conventional photoanode-based DSSCs.

**Keyword:** N-doped TiO2-Au; Nanocomposite; Plasmonic photoanode; Dye-sensitized solar cells