



# 2016 中技社境外生研究獎學金

## CTCI Science and Technology Research Scholarship



### 2016 CTCI Foundation Scholarship for Overseas Graduate Students



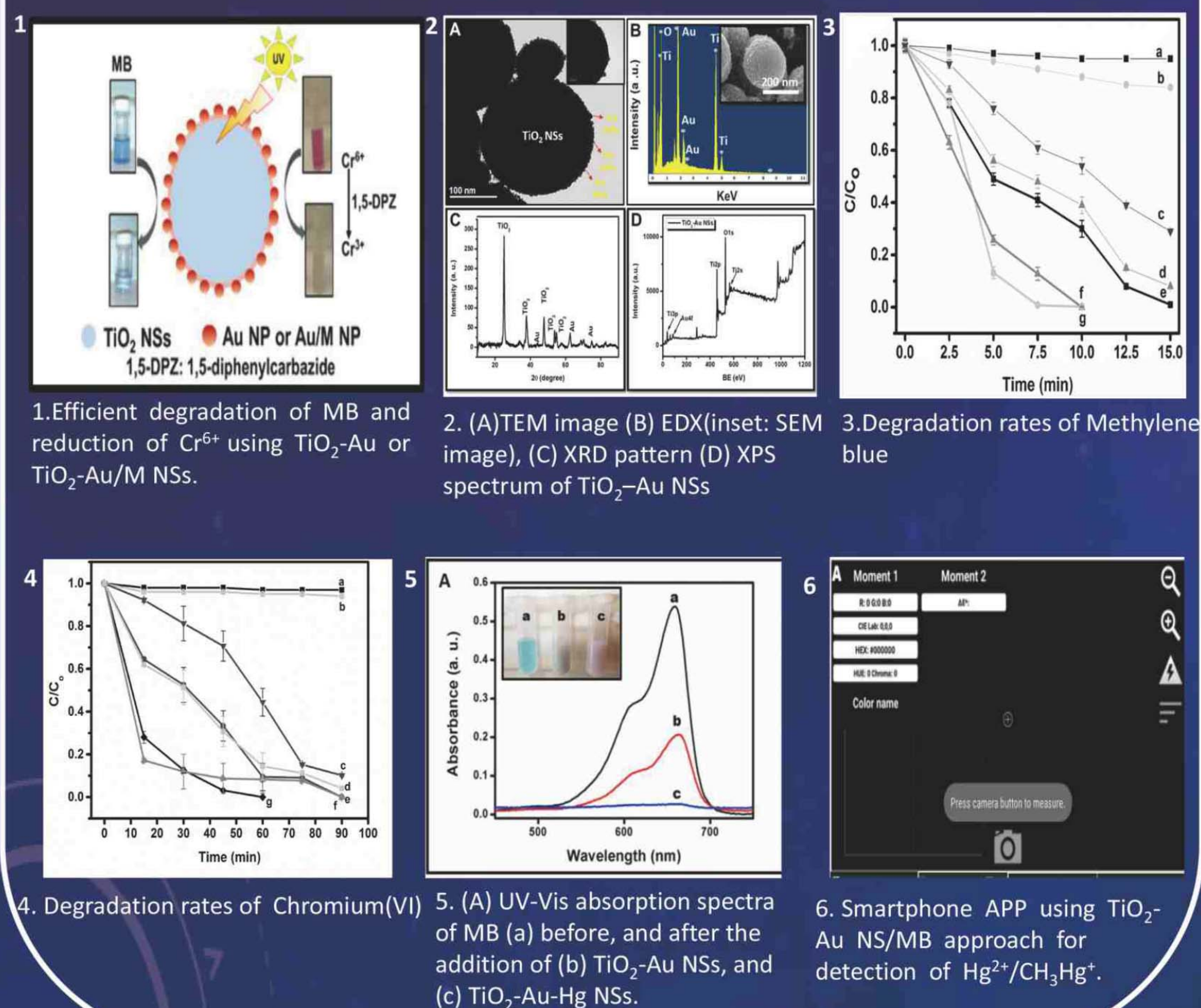
## Synthesis Of Nanocomposites for the Removal of Toxic Pollutants and Heavy Metals and for the Development of Next Generation Power Sources

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Photocatalytic titanium dioxide nanospheres ( $\text{TiO}_2$  NSs) doped with gold nanoparticles (Au NPs) has been used towards degradation of organic and inorganic pollutants. The effect of deposited ions like  $\text{Hg}^{2+}$  and  $\text{Ag}^+$  on  $\text{TiO}_2$ -Au NSs have also been studied, revealing their extraordinary influence in increasing its photocatalytic degradation efficiency, allowing it to be used for methylene blue (MB) and chromium(VI) ( $\text{Cr}^{6+}$ ) degradation. Based on this a novel sensing strategy has been developed for the highly sensitive, selective and colorimetric detection of mercury using the  $\text{TiO}_2$ -Au NSs. The strategy is based on the difference in rate of degradation of MB in the presence and absence of  $\text{Hg}^{2+}$  doped onto  $\text{TiO}_2$ -Au NSs. The sensor has been used to detect mercury ions in water, soil and most importantly, fish. Furthermore, we have developed a strategy to enable on field detection in water and soil using an APP. We are also developing prepared hybrid silicon nanosheets (NSs)/graphene quantum dot nanocomposites (Si-GQD NCs) from a mixture of GQDs and Si NSs in ethanol at room temperature for application as high performance catalyst for oxygen reduction reactions (ORR) in direct methanol fuel cells (DMFCs).

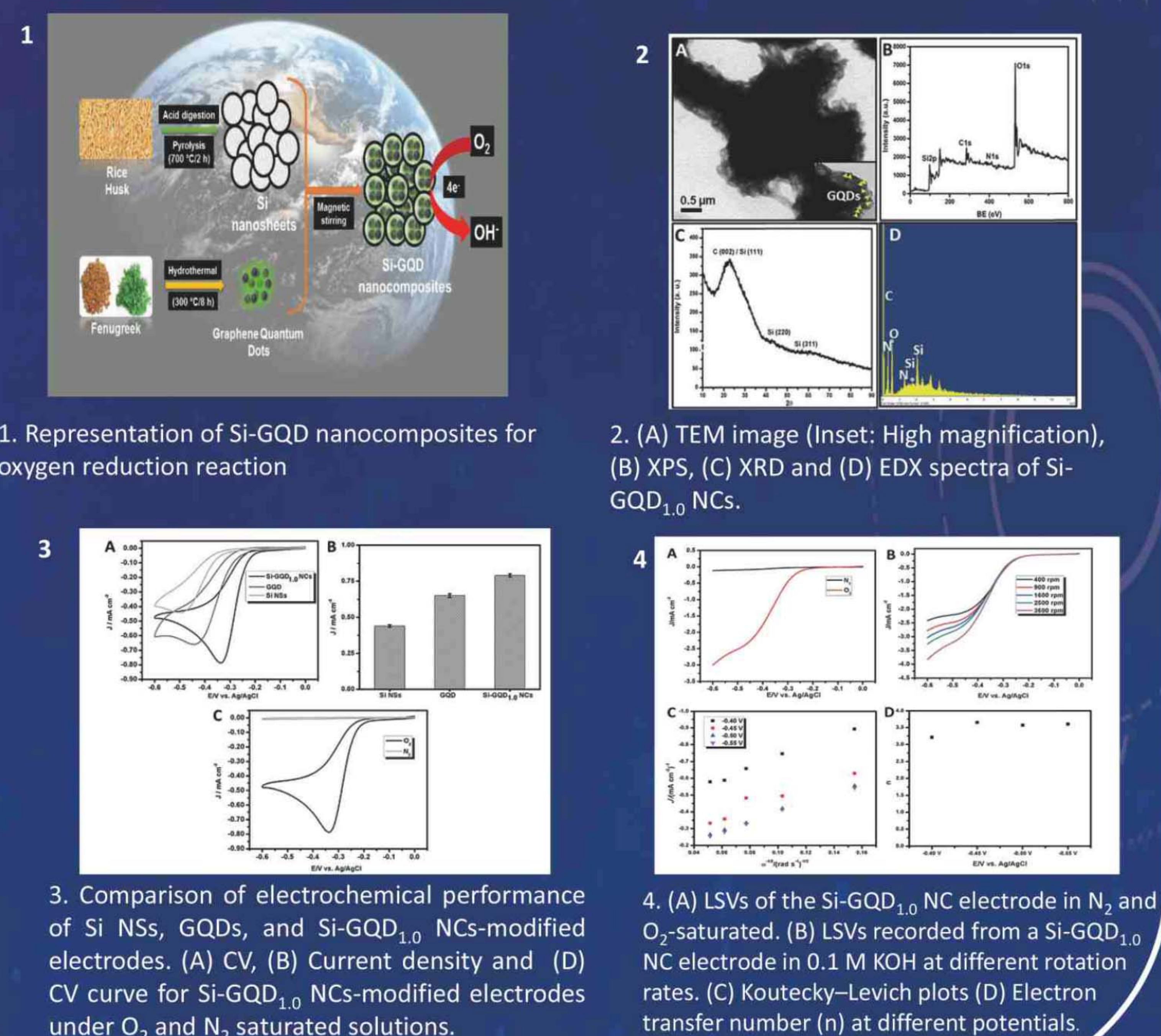
#### $\text{TiO}_2$ -Au Nanospheres Based Removal of Pollutants and On-Field Detection of Trace Mercury in Water and Fish Using a Smart-APP

Rini Ravindranath, P. Roy, A.P. Periasamy and H.-T. Chang, *RSC Adv.*, 2014, 4, 57290–57296.



#### Green Synthesis of Si-GQD Nanocomposites as Cost-effective Catalysts for Oxygen Reduction Reaction

Rini Ravindranath, P. Roy, A.P. Periasamy and H.-T. Chang, *RSC Adv.*, 2016, 6, 108941-108947.



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