

## A Highly Efficient and Durable Electrocatalyst based on N-incorporated into Mesoporous NiO Functionalized Melamine for Glycerol and Methanol Electrooxidation

Khalil Abdelrazek Khalil<sup>1,2</sup> and D. Khallafallah Hassen<sup>1</sup>

<sup>1</sup>Mechanical Design and Materials Department, Faculty of Energy Engineering, Aswan University, Egypt

<sup>2</sup>Department of Mechanical Engineering, College of Engineering, University of Sharjah, UAE

Cost-effective and highly active electro catalysts for alcohols electro oxidation reaction are of great importance in order to widespread the commercial feasibility of fuel cell technology. However, the commercial validity of alcohols fuel cells is significantly hindered owing to the high cost of the noble metal catalysts and concurrent activity degradation. Herein, we report the design of nitrogen doped nickel oxide-porous carbon hybrid as a potential solution to this long standing issue. The embedding of conductive carbon dots into the hierarchical nano architecture is expected to play the decisive role in promoting the electro catalytic performance towards methanol and glycerol electro oxidation and enable better utilization exposed electroactive sites. As a result, the synthesized hybrid show exceptional activity for both methanol and glycerol oxidation reaction due to the synergy of Ni<sup>3+</sup>/Ni<sup>2+</sup> active sites and carbon dots as over 80,000 s which is largely attributed to the strong mutual interactions of well as nitrogen species. In addition, the hybrid reveals remarkable durability under periodic reactivation components leading to fast electrocatalysis and unprecedented durability for methanol oxidation reaction (MOR).

### Biography:

Prof. Khalil is currently working as a professor and head of the Mechanical Engineering Department at the University of Sharjah. After graduating from Minia University, Faculty of Engineering, in 1990, he worked for three years in Sugar and Integrated Industries Company (SIIC) as a planning and follows up engineer. In July, 1995, he moved from SIIC to work as a demonstrator in Faculty of Energy Engineering, Aswan University, Egypt. In 1996 he completed his Master Degree. In 1998 he was accepted into the Trans-Century Training Program for Talents by the Ministry of Education of China and the Ministry of Higher Education of Egypt as a scholarship student to complete his Ph. D degree. He earned PhD in 2002. He was promoted to Assistant Professor in 2002. He got an opportunity for Postdoc fellowship in Chonbuk National University (CBNU), South Korea from 2004-2005. He was later selected through the Long-Term Foreign Faculty Program for another 2 years in the same University. In 2008, he has been appointed as Associate Professor in Faculty of Engineering, King Saud University. He has published more than 100 ISI papers of international standard with high impact factor in addition to 3 patent and two book chapters. He is also running more than five funded projects. He has promoted to the rank of full professor in both Saudi Arabia and Egypt in 2011.