



Surface chemical reactions at self-heated metal oxide nanowires

Prof. Joan Ramon Morante

[Catalonia Institute for Energy Research \(IREC\)](#)

Catalonia, Spain

Current sources applied to metal oxide nanowires dissipate enough heat by Joule effect as function of the used current density and nanowires characteristics. Here, it is used to control the nanowire temperature and thus modulate the chemical reactions taking place at the surface as nanowire interacts with the environment. These mechanisms became essential for the future development and implementation of advanced catalysts that will be discussed. Besides, the chemical reactions occurring at the surface, the charge interchanges between nanowire and absorbed molecules constitute by itself a transduction mechanism still available for designing precise chemical sensors converting chemical information into electrical one. As example ammonia gas sensor devices based on these mechanisms will be presented and discussed. Chemical steps followed for the ammonia molecule at the surface of the metal oxide will be described and the final transduction mechanism experimentally verified and assessed. Competitive mechanisms such as those due to the presence of humidity at the ambient will also be discussed. Finally, strategy for implementing this kind of device based on the evolution from the laboratory using individual nanowire towards a parallel multi nanowires based device feasible at industrial level will also be presented, discussed and evaluated as well as other nano materials or nano devices based alternatives for building fully autonomous nano systems.