

*Title:* **Preparation and characterisation of nanostructured HOPG substrates for nanoparticle deposition under electrochemical control**

*Student:* Andrea Egurbide Sifre

*Date:* February 2019

*Supervisor/s:* Dr. Friedrich Esch  
*Department of Physical Chemistry, TUM*

Highly oriented pyrolytic graphite presents an inert surface chemically stable in a wide potential range. This is the reason why it is being studied for the future deposition of size-selected Pd clusters under electrochemical control, as these clusters show a promising approach to perform catalytic reactions. This work focuses on the generation of monolayer holes in the top surface layer of HOPG samples to be used as supports for the subsequent deposition of Pd nanoparticles. The experiments performed on ZYH and ZYA quality HOPG crystals started with the exposition of ZYH samples to high temperature oxidation treatments, which had no success. Afterwards, ZYH and ZYA samples faced sputtering with three different plasmas ( $O_2$ , Ar,  $H_2$ ) in a microwave, at different conditions of pressure, power and time, and posterior thermal treatments to enlarge the holes. The characterisation and the study of the topography of the obtained HOPG surfaces was performed by scanning tunnelling microscopy and atomic force microscopy.