1st Call for H.F.R.I. Research Projects for the Support of Faculty Members and Researchers and the Procurement of high-cost Research Equipment

Title:	Development of sustainable chemoenzymatic processes for optically pure amines from alcohols or alkynes
Project Acronym:	CEPOPA
Project No:	664
P.I.:	Assist. Prof. Ioannis Pavlidis
Deliverable	D1.1. Optimized protocol for the synthesis of GO of high catalytic activity

Three synthetic routes have been investigated for the synthesis of GO of high catalytic activity. All studies were performed in collaboration with the Layered and Nanoporous Materials Lab, at the University of Ioannina, as they are experienced in synthesizing and characterizing carbon-based nanomaterials. The material that exhibited the best catalytic activity was the one based on Hummer's method.[1] The exact protocol is provided below:

Step #1: In a (at least) 500 mL beaker, 0.5 g graphite is added alongside with 23 mL H_2SO_4(98% w/w) and 0.5 g $NaNO_3$. The reaction mixture is stirred for 15 m in an ice bath.

Step #2: 3.2 g $KMnO_4$ are added gradually and the mixture is stirred for 1 h at 28ºC.

Step #3: 40 mL of dH_2O are added and the temperature is raised to 95ºC. Stirring continues for 30 min.

Step #4: 100 mL of warm (35-40ºC) H_2O are added.

Step #5: Slowly 5 mL of H_2O_2 (30% w/w) are added and the mixture is constantly stirred.

Step #6: The reaction mixture is centrifuged and washed multiple times with dH_2O until the supernatant's pH is close to neutral. Then, the supernatant is discarded, and the material is dried overnight in room temperature.

Literature:

1. *Hummers W.S. & Offeman R.E. (1958) Preparation of graphite oxide. J. Am Chem. Soc. 80(6): 1339-1339*