

# FINAL MASTER PROJECT PROPOSAL



## Title

**Synthesis and characterization of Graphenic Carbonaceous Nanomaterials by CCVD.**

## Supervisor(s)

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## Summary of the project

In this Final Master Project, it is proposed to carry out an experimental study of the kinetics of formation graphene related nanomaterials through the Catalytic Chemical Vapour Deposition (CCVD) process. This process includes the decomposition at high temperatures (between 800 and 950 °C) of gaseous light hydrocarbons like methane, ethane or ethylene. This method can use different catalytic substrates containing Ni, Fe and/or Co nanoparticles, usually doped with different transition metals (eg Cu, Mo, Mn). At the exit of the reactor, the gas stream contains H<sub>2</sub>, without CO<sub>x</sub>, and a solid carbonaceous nanomaterial that remains deposited over the catalyst. The objective of this work is to investigate the influence of the catalyst composition and of the operating conditions during the CCVD (mainly temperature and composition of the feed stream) on the rate of formation of the carbonaceous nanomaterials and on the structural and textural properties of the carbonaceous materials obtained. The experimental results will be analyzed by rigorous kinetic models based on the reaction mechanism. Will be uses Ni, Fe or Co catalysts, modified with Mn, Cu or Mo. Throughout the work, the catalysts and materials obtained will be characterized, before and after reaction, by different techniques like Thermogravimetric Analysis (TGA), Adsorption of N<sub>2</sub>, X-Ray Diffraction (XRD), X-Ray Photoelectron Spectroscopy (XPS), Raman Spectroscopy and Transmission and Scanning Electron Microscopy (TEM, SEM-EDX).