



“Alternanza Scuola Lavoro”  
stages, agreement ISTM-CNR –  
Liceo Scientifico Statale “G.  
Falcone e P. Borsellino”

**ACTIVITY REPORT**



The activity within the “Alternanza Scuola Lavoro” agreement between the Institute of Science and Molecular Technology of the National Research Council (hereinafter ISTM-CNR) and Liceo Scientifico Statale “G. Falcone e P. Borsellino” (hereinafter Liceo) secondary high school consisted in the training, 15 working days long, of two students of the Liceo, Mr Giacomo Bordoni and Ms. Federica Villafranca, (hereinafter the students) in ISTM-CNR premises, involving the students in research activities performed by ISTM-CNR research groups, coordinated by Prof. Vladimiro Dal Santo and by Dr. Claudio Evangelisti.

Research activities were selected in order to be compliant with EIT Raw Materials and FREECATS NoI main themes, i.e. Raw Materials and CRM-free catalysts development.

The two stages were performed from 5/09/2016 to 23/09/2016.

During the first week all students involved in “Alternanza Scuola Lavoro” stages were trained on the following general topics, necessary to guarantee compliance with safety regulations of ISTM-CNR and to provide a common basis to all students:

Introduction to lab safety;

Characteristics of different chemical elements and different (mostly inorganic) compounds;

Basics of literature survey and key words search;

Then the students were trained on specific topics such as the following:

Introduction to metal-based heterogeneous catalysts including instrument analysis for characterize them (i.e. DLS, IR-spectroscopy, UV-Vis spectroscopy, ICP-OES); Introduction to transmission electron microscopic techniques for the characterization of the structure and analytical composition of nanostructured materials (i.e. TEM, STEM and EDX analysis). Basic preparative lab techniques (e.g. set-up and use of simple lab equipment and set-up to work under inert atmosphere). Basic catalysts testing lab techniques (e.g. set-up and use of simple lab equipment and set-up to test heterogeneous catalysts and photocatalysts ).



During the last 10 working days of the stages the students were involved in hands-on activities, in cooperation with Post-Docs and PhD students (to establish a more friendly and informal mentoring and promoting active involvement of the students).

The hands-on activities consisted in

1. preparation of different PGM-free heterogeneous catalysts based on Cu nanoparticles immobilized on different organic and hybrid supports (i.e. polystyrene-based resins, silica-based supports). Application of the synthesized Cu-based catalysts in the copper-catalyzed azide-alkyne cycloaddition (CuAAC reaction).

2. preparation of CRM-free iron oxides photocatalysts, based on iron salts as starting raw material, by wet techniques. Testing of photocatalysts in Methylene Blue photo-oxidation, employing a photo-reactor, solar simulator, and UV spectroscopy to follow the reaction.

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