

## Publications

Dr. Elena Castellini is author of several articles in *peer-reviewed* international journals concerning applied mineralogy and clay-based materials.

She currently serves as referee for several international journals (23): Applied Clay Science, Applied Surface Science, Environmental Technology, Journal of Hazardous Materials, The Canadian Mineralogist, Minerals, Arabian Journal of Geosciences, Journal of Materials Chemistry B, Journal of Colloid and Interface Science, Colloids and Surfaces A: Physicochemical and Engineering Aspects, Chemical Communications, Journal of the American Ceramic Society, Journal of European Ceramic Society, Analyst, Journal of Molecular Catalysis B: Enzymatic, Desalination and water treatment, Journal of Chemical Thermodynamics, Journal of Solution Chemistry, Applied Sciences, Powder Technology, Materials, Molecules, Science and Technology of Materials. Her reviewer activity is reported in her public profile on Publons.

Elena Castellini is Guest Editor of the Special Issue of *Minerals* (ISSN 2075-163X) "Synthesis, Properties and Applications of Expandable Layer Silicates".

She participates in the COST project "Chemobrionics (CBrio) CA17120", Proposer: Prof. Julyan Carthwright; Italian Management Committee: Dr. Diego Luis Gonzalez and Prof. Simone Giannerini.

## Research activity

The research activity is focused on the applications of clay minerals that, suitably functionalized through adsorption/intercalation processes, can be exploited in environmental or (bio)catalytic contexts.

The main research field includes:

**Gas trapping:** production of hybrid materials working at the solid-gas interface able to capture hazardous and smelling gas pollutants from petrochemical industries and combustion of oil and natural hydrocarbons (thiols, hydrogen sulfide, polyaromatic hydrocarbons and their alogeno-derivatives, amines). The solid trap must allow for recovery and reuse. For this purpose, we exploit natural clay minerals (kaolinite, montmorillonite, sepiolite), functionalized by adsorption and intercalation of metal complexes. These functional materials can be profitably exploited in the fields of environment remediation and human health protection.

**Heterogeneous catalysis:** study of the adsorption of biological molecules on kaolinite as a first step to understand how immobilization on a clay mineral can tune the properties of adsorbed biomolecules. In particular, we focus on the ability of immobilized cytochrome *c* and its mutant to catalyze oxidation of pollutant and organic molecules in the liquid phase, such as phenols. The goal is the production of a solid mineral-cytochrome interface imparted with efficient heme-based peroxidase activity with the advantages of heterogeneous catalysis, in particular maximization of the surface of contact between catalyst and reagents and the easy recovery of the catalyst at the end of the reaction. This catalyst, made by a cytochrome *c* adsorbed on a clay mineral, is a green catalyst.

**Deflocculation of clay mineral suspensions:** study of the interaction of clay minerals with deflocculants to define the physical and chemical bases of their mechanism of action and to define the correlations existing between the structure of the mineral-deflocculant interface and the rheological properties of the mineral suspensions.

Elena Castellini collaborates with several Italian and foreign scientists:

Professor Maria Franca Brigatti, Dr. Daniele Malferrari and Dr. Fabrizio Bernini, University of Modena, Department of Chemical and Geological Sciences, Modena, Italy.

Professor Antonio Ranieri, Dr. Giulia di Rocco and Dr. Carlo Augusto Bortolotti, University of Modena, Department of Life Sciences, Modena, Italy.

Professor Giovanni Valdrè, University of Bologna Alma Mater Studiorum, Dipartimento di Scienze Biologiche, Geologiche e Ambientali, Bologna, Italy.

Professor Stefano Corni, University of Padova, Department of Chemical Sciences, Padova, Italy.

Professor Valter Sergo, University of Trieste, Department of Engineering and Architecture, Trieste, Italy.

Dr. Christoph Berthold, Eberhard Karls University of Tübingen, Department of Geoscience and Competence Center Archaeometry Baden Wuerttemberg, Tübingen, Germany.

Professor Federica del Monte, Gazes Cardiac Research Institute, Division of Cardiology, Department of Medicine, Medical University of South Carolina, Charleston, SC 29425, USA.

Dr. Claro Ignacio Sainz-Díaz, University of Granada, Instituto Andaluz de Ciencias de la Tierra (CSIC-UGR), Granada, Spain.

Dr. German Rafael Castro, European Synchrotron Radiation Facilities (ESFR), SpLine, Spanish CRG BM25 Beamline, Grenoble, France and Instituto de Ciencia de Materiales de Madrid (ICMM), CSIC, Madrid.

Dr. Aida Serrano, European Synchrotron Radiation Facilities (ESFR), SpLine, Spanish CRG BM25, Grenoble, France and Instituto de Cerámica y Vidrio (ICV), CSIC, Madrid, Spain.

Dr. Carlo Marini and Dr. Giulio Gorni, ALBA Synchrotron Radiation Facility, BL22 – CLÆSS, Cerdanyola del Valles, Barcelona, Spain.