

# Mattia Lopresti

PH.D. IN CHEMISTRY & BIOLOGY · MATERIALS SCIENTIST

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## Education

### University of Eastern Piedmont

PH.D. SCHOOL IN CHEMISTRY & BIOLOGY

- Thesis title: "Non-destructive X-ray based characterization of materials assisted by multivariate methods of data analysis: from theory to application."

Alessandria - Italy

Nov. 2018 - Feb. 2022

### University of Eastern Piedmont

MASTER DEGREE IN CHEMISTRY

- Thesis title: "Study and development of analysis methods of ternary mixtures through diffraction and spectrophotometric techniques."

Alessandria - Italy

Sep. 2014 - Oct. 2017

### University of Eastern Piedmont

BACHELOR DEGREE IN MATERIALS SCIENCE

- Thesis title: "Development of systems for self-healing cementitious materials."

Vercelli - Italy

Sep. 2010 - Apr. 2014

## Skills

### Operating systems

Windows, Linux (various distro: Ubuntu, Raspbian, Kali, ...), iOS, basic and advanced tools.

### Common softwares

Office suite, browsers, Photoshop, AutoCad, Gimp, Draftsight.

### Statistical softwares

R and R Studio, Statistica, The Unscrambler, RootProf, SPSS.

### Web Programming

HTML5, CSS, Javascript, preprogrammed libraries (Bootstrap and jQuery).

### Programming

C, ROOT, C++/Geant4, Arduino, LaTeX.

### X-Rays skills

X-Ray Fluorescence (XRF), X-Ray Powder Diffraction (XRPD), X-Ray Single Crystal Diffraction (SC-XRD).

### Crystallographic skills

Structure analysis, refinements, structure solution from single-crystal and powder data, in situ experiments.

### Spectroscopy skills

UV-Visible, Fourier-Transformed Infrared (FT-IR / ATR-FT-IR), FT-Raman.

### Thermal analysis skills

Thermogravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC).

### Chemometrics

Cluster analysis, pattern recognition, regressions, DOE, control charts, modelling, neural networks.

### Languages

English (Proficient user), Japanese (Independent user).

## Working Experience

### University of Eastern Piedmont

POSTDOC RESEARCHER

- Development and application of analysis methods for non-destructive testing of materials in non-ambient conditions and *in situ*.

Alessandria

Mar. 2022 - Today

### University of Eastern Piedmont

RESEARCHER WITH SCHOLARSHIP

- Development and application of analysis methods for non-destructive testing of materials in static conditions.

Alessandria, Italy

Dec. 2021 - Feb. 2022

### Enartis

FORMATIVE TRAINEE

- Use of analytical techniques of analysis and characterization of wines and other winemaking products.
- Use of chemometric and experimental design techniques for exploratory analysis and optimization of instruments and analytical techniques.
- Analysis of wines and adjuvants through nose-tasting and mouth-tasting.

Trecale - Italy

Apr. 2018 - Oct. 2018

### University of Eastern Piedmont

RESEARCHER WITH SCHOLARSHIP

- Expert advice to small-medium industries over chemistry and materials science problems.
- Use of chemometric tools for problem-solving and process optimization.

Alessandria, Italy

Sep. 2015 - Sep. 2016

### Buzzi Unicem

RESEARCHER WITH SCHOLARSHIP

- Research and development on self-healing cementitious materials.
- Use of experimental designs for exploratory analysis and optimization.
- Use of chemometric techniques for multivariate analysis of data sets.

Trino Vercellese, Italy

Sep. 2014 - Sep. 2015

### Consorzio UNIVER

RESEARCHER WITH SCHOLARSHIP

- Research and development consultant for DUALCEM regional project: a study on self-healing cementitious materials.

Vercelli, Italy

Apr. 2014, Sep. 2014

# Teaching Experience

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## University of Turin, CRISDI

FUNDAMENTALS OF X-RAY DIFFRACTION METHODS: POLYCRYSTALLINE

- 8hrs course on X-ray powder diffraction at CRISDI Ph.D. international school 2022 and 2023.

Torino, Italy

Jun. 2022 - Jun. 2023

## University of Eastern Piedmont

COMPLEMENTARY MATHEMATICS AND COMPUTER TECHNOLOGY FOR CHEMISTRY: COMPUTER, STATISTICAL AND COMPUTATIONAL TOOLS

- Supplementary teaching at UPO.

Vercelli

Sep. 2022 - Jul. 2024

## ITS of Rivoli

CHEMISTRY OF BUILDING MATERIALS

- Teaching at ITS of Rivoli for the course in "Chemistry of building materials".

Rivoli, Italy

Apr. 2019 - Oct. 2020

## University of Eastern Piedmont

PHYSICAL CHEMISTRY AND THERMODYNAMICS

- Supplementary teaching at UPO for the course in "Chemistry-physics: thermodynamics".

Alessandria

Apr. 2019 - Jun. 2022

# Honors & Awards

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2023 **Winner**, Ph.D. Thesis Prize "F. Mazzi" 2023 from Associazione Italiana di Cristallografia.

Bologna, Italy

2023 **Lead guest editor**, of MDPI's Crystals special issue "Young Crystallographers Across Europe".

Basel, Switzerland

2015-2018 **Winner**, Scholarship from CEN - Cassa Edile Novara for proficiency.

Novara, Italy

# Publications

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## Light weight, easy formable and non-toxic polymer-based composites for hard X-ray shielding: a theoretical and experimental study

MATTIA LOPRESTI, GABRIELE ALBERTO, SIMONE CANTAMESSA, GIORGIO CANTINO, ELEONORA CONTEROSITO, LUCA PALIN, MARCO MILANESIO \*

*International Journal of Molecular Science*

Article

## In situ X-ray diffraction study of Xe and CO<sub>2</sub> adsorption in Y zeolite: a comparison between Rietveld and PCA-based analysis

ELEONORA CONTEROSITO, MATTIA LOPRESTI, LUCA PALIN \*

*Crystals special issue: "Multivariate Analysis Applications to Crystallography"*

Article

Three new structures were submitted to the Crystallographic Open Database (COD). IDs: 3000262, 3000263, 3000264, 3000265.

## Epoxy resins composites for X-ray shielding materials additivated by coated barium sulfate with improved dispersibility

MATTIA LOPRESTI, LUCA PALIN, GABRIELE ALBERTO, SIMONE CANTAMESSA, MARCO MILANESIO\*

*MaterialsToday Communications*

Article

## Multivariate Analysis Applications in X-ray Diffraction

PIETRO GUCCIONE, MATTIA LOPRESTI, MARCO MILANESIO, ROCCO CALIANDRO \*

*Crystals special issue: "Multivariate Analysis Applications to Crystallography"*

Review Article

## XRF and XRPD data sets in ternary mixtures with high level micro-absorption and/or preferred orientations problems for phase quantification analysis

BEATRICE MANGOLINI, LUCA PALIN, MARCO MILANESIO, MATTIA LOPRESTI \*

*Data in Brief*

Data Article

An Open Database for diffraction and element analysis of mixtures had been created.

## Low-Cost Biobased Coatings for AM60 Magnesium Alloys for Food Contact and Harsh Environment Applications

BEATRICE MANGOLINI, MATTIA LOPRESTI, ELEONORA CONTEROSITO \*, GIUSEPPE ROMBOLÀ, LUCA PALIN, VALENTINA GIANOTTI, MARCO MILANESIO

*International Journal of Molecular Science*

Article

## **IEteasy: an open source and low-cost instrument for impulse excitation technique, applied to materials classification by acoustical and mechanical properties assessment**

NAZARENO MASSARA, ENRICO BOCCALERI, MARCO MILANESIO, MATTIA LOPRESTI\*

*Hardware X*

*Article*

## **Impulse excitation technique data set collected on different materials for data analysis methods and quality control procedures development**

NAZARENO MASSARA, ENRICO BOCCALERI, MARCO MILANESIO, MATTIA LOPRESTI\*

*Data in Brief*

*Article*

## **Multivariate vs. traditional quantitative phase analysis of X-ray powder diffraction and fluorescence data of mixtures showing preferred orientation and microabsorption**

MATTIA LOPRESTI, BEATRICE MANGOLINI, MARCO MILANESIO, ROCCO CALIANDRO, LUCA PALIN\*

*Journal of Applied Crystallography*

*Article*

## **Exploring the polymorphic landscape of molecular complexes between naproxen drug and acridines**

ARTUR MIROCKI, MATTIA LOPRESTI, LUCA PALIN, ARTUR SIKORSKI, MARCO MILANESIO\*

*CrystEngComm*

*Article*

Three new structures were submitted to the Cambridge Crystallographic Data Centre (CCDC). IDs: 2168756, 2168757, 2169121.

## **Hard ultralight systems by thermal spray coating of AZ31 magnesium alloy**

STEFANIA MORELLI, GIUSEPPE ROMBOLÀ, GIOVANNI BOLELLI, MATTIA LOPRESTI, PIETRO PUDDU, ENRICO BOCCALERI, LUCA SERALESSANDRI, LUCA PALIN, VERONICA TESTA, MARCO MILANESIO, LUCA LUSVARGHI\*

*Surface & Coatings Technology*

*Article*

## **Crystal structure of a new 1:1 acridine-diclofenac salt, obtained with high yield by a mechanochemical approach**

ARTUR MIROCKI, ELEONORA CONTEROSITO, LUCA PALIN, ARTUR SIKORSKI, MARCO MILANESIO, MATTIA LOPRESTI\*

*Crystals*

*Article*

A new structure was submitted to the Cambridge Crystallographic Data Centre (CCDC). ID: 2211637.

## **PCA analysis of in situ X-ray powder diffraction and imaging data shedding new light on solid-state transformations: the crystallization of eutectic mixtures**

MATTIA LOPRESTI, BEATRICE MANGOLINI, ELEONORA CONTEROSITO, MARCO MILANESIO, LUCA PALIN\*

*Crystal Growth and Design*

*Article*

## **The crystal structure of calcium sebacate by X-ray powder diffraction data**

MATTIA LOPRESTI, MARCO MILANESIO, LUCA PALIN\*

*Crystals*

*Article*

## **New features of the RootProf program for model-free analysis of unidimensional profiles**

ANNAMARIA MAZZONE, MATTIA LOPRESTI, BENNY DANILO BELVISO AND ROCCO CALIANDRO\*

*Journal of Applied Crystallography*

*Article*

## **Crystallization from solution versus mechanochemistry to obtain double-drug multicomponent crystals of ethacridine with salicylic/acetylsalicylic acids**

ARTUR MIROCKI, MATTIA LOPRESTI, LUCA PALIN, ELEONORA CONTEROSITO, EMILIA SIKORSKA, ARTUR SIKORSKI AND MARCO MILANESIO\*

*Scientific Report*

*Article*

## **Conference papers**

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### **KN2: Analysis of X-Ray Powder Diffraction and Raman data by a statistical multivariate approach**

MARCO MILANESIO, LUCA PALIN, ELEONORA CONTEROSITO, VALENTINA TOSON, ENRICO BOCCALERI, MATTIA LOPRESTI, ROCCO CALIANDRO

*XLVI Meeting of Italian Crystallographic Association, 2017 - Perugia*

*Conference paper*

### **Multivariate analysis of X-ray diffraction and XAFS data**

ROCCO CALIANDRO, ANNAMARIA MAZZONE, DANILO BENNY BELVISO, PAOLO GUCCIONE, MARCO MILANESIO, LUCA PALIN, MATTIA LOPRESTI

*25th IUCr Congress, 2020 - Praga*

*Conference paper*

## Co-crystallization in solid state conditions of molecular complex based of naproxen and diclofenac with acridine derivatives

MATTIA LOPRESTI, LUCA PALIN, MARCO MILANESIO, ARTUR MIROCKI, ARTUR SIKORSKI

*Italian Crystal Growth, 2021 - Turin*

*Conference paper*

## Artificial intelligence as a new tool for qualitative and quantitative phase analysis from X-ray powder diffraction data

MATTIA LOPRESTI, FABIO MORA, LUCA PALIN, MARCO MILANESIO

*Ital-IA, 2022 - Turin*

*Conference paper*

## KN9: Multivariate innovative methods for the analysis of in situ X-ray powder diffraction data collected in the presence of chemical, spatial, temperature or time gradients

MATTIA LOPRESTI, LUCA PALIN, ELEONORA CONTEROSITO, BEATRICE MANGOLINI, ROCCO, CALIANDRO, MARCO MILANESIO

*33rd European Crystallography Meeting, 2022 - Versailles*

*Conference paper*

## MS40: Differential scanning diffraction and differential scanning imaging as novel methods for in situ studies of organic eutectic systems

MATTIA LOPRESTI, MARCO MILANESIO, LUCA PALIN, MATTEO BONOMO, CLAUDIA BAROLO

*33rd European Crystallography Meeting, 2022 - Versailles*

*Conference paper*

## Principal component scores projection on a barycentric coordinate system for a quantification in polycrystalline mixtures XRPD data without crystal structure data

MATTIA LOPRESTI, MARCO MILANESIO, LUCA PALIN, ELEONORA CONTEROSITO, BEATRICE MANGOLINI

*4° Joint AIC-SILS congress, 2022 - Trieste*

*Conference paper*

## PCA analysis of in situ X-ray powder diffraction and imaging data: new approaches named differential scanning diffraction and imaging

MARCO MILANESIO, LUCA PALIN, MATTIA LOPRESTI, ELEONORA CONTEROSITO, BEATRICE MANGOLINI

*4° Joint AIC-SILS congress, 2022 - Trieste*

*Conference paper*

## Differential scanning diffraction for in situ investigations of choline-based deep eutectic solvents

MATTIA LOPRESTI, MARCO MILANESIO, LUCA PALIN, MATTEO BONOMO, CLAUDIA BAROLO

*50° Meeting of Italian Crystallographic Association, 2023 - Bologna*

*Conference paper*

## Are modern lab powder diffractometers “small large scale facilities”?

MARCO MILANESIO, MATTIA LOPRESTI, LUCA PALIN, ROCCO CALIANDRO, BENNY DANILO BELVISO

*50° Meeting of Italian Crystallographic Association, 2023 - Bologna*

*Conference paper*

## Exploring low temperature behavior of superacid-based ionic liquids through in situ XRPD analysis

MATTIA LOPRESTI, DMITRY CHERNISHOV, MATTEO BONOMO, ALESSANDRO MARIANI, CLAUDIA BAROLO, DOMENICA MARABELLO, LUCA PALIN, AND MARCO MILANESIO

*50° Meeting of Italian Crystallographic Association, 2023 - Bologna*

*Conference paper*

## Extra Activities

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### Italian Crystallographic Association

MEMBER

- Member of the Italian Crystallographic Association.

*Italy*

*Nov. 2019 - Today*

### European Crystallographic Association

MEMBER

- Member of the European Crystallographic Association. Member of the General Interest Group - 01 and of the Special Interest Group - 08.

*Italy*

*Lug. 2022 - Today*

### AI@UPO

MEMBER

- Member of the Artificial Intelligence research center of the University of Eastern Piedmont.

*Italy*

*Jul. 2020 - Today*

## Interdepartmental Center for Crystallography

MEMBER

- Member of CRISDI at UniTo.

*Italy*

*Mar. 2022 - Today*