

# Coatings 2023 Early Career Investigator Award: Announcement and Interview with the Winner

Coatings Editorial Office

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## 1. What Is Your Current Research Study and Why Did You Choose This Research Field?

Since 2021, I have been working on a very exciting research project led by Prof. Maria Chiara Bignozzi for the development of optimal mix designs for the application of commonly applied forming techniques (i.e., pressing, extruding and casting) for sustainable construction materials. Our research group has a depth of past experience working with alkali-activated materials and geopolymers for paste and mortar preparation, especially when carbon coal fly ashes have been applied as precursors. In this project, however, we have worked with flash calcined metakaolin and are attempting to add by-products derived from the ceramic industry (i.e., Italian ceramic porcelain stoneware industries) to increase the sustainability of the applied precursors. Thanks to the help of some students who attended our laboratories for the preparation of their Bachelor's and Master's theses (Carlotta Sassi, Giorgia Neri, Emilio Minichiello and Carlotta Pacente), a research assistant (Antonietta Settino) and some colleagues (Andrea Sacconi and Maria Chiara Bignozzi), we identified the best parameters required to obtain optimized mix designs for pressing for the production of low-temperature consolidating ceramic-like materials and for extrusion for 3D printing applications of more sustainable composites compared to clay- or cement-based materials. We are currently assessing the performances of the hardened materials via the systematic characterization of microstructural, mechanical and durability properties using a multi-analytical approach to continuously improve our materials and compare them to already-available ones. We will also collaborate with some industries located in our region (Emilia Romagna) to test our most promising materials in an industrial environment to scale up processes and prepare some prototypes for testing in our laboratories. I greatly appreciate the support of enthusiastic and collaborative industries because they are adding fundamental value to our project for the benefit of the society and the industries in our region.

## 2. What Qualities Do You Think That Young Scientists Need?

Young researchers and scientists should have three fundamental skills: **passion**, **curiosity** and **problem solving**. First of all, passion is a key quality as it allows young scientists to be resilient while conducting research. The research path is not always easy due to the fact that to work in scientific research, students must first complete a 3-year PhD after earning their Master's degree, followed by a postdoctoral period (for a maximum of 6 years), where they must strongly improve their scientific CV to gain a permanent position at a university or other scientific institution. Both PhD and postdoctoral studies can be tough and stressful experiences, as students are requested to perform high-level research despite being young scientists who need to train themselves to conduct research. In addition, neither of these positions in Italy are well funded or paid. So, passion is fundamental to face and overcome all the issues, stressful moments and problems related to conducting research, working in a laboratory and collaborating with colleagues and students to achieve results or proceed with a project. Both curiosity and problem solving are tools that allow young, passionate scientists to be successful in research: they should always ask themselves lots of questions about their research project and should have the curiosity to find the best answer in both the

**Citation:** Coatings Editorial Office.

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Coatings 2024, 14, 447. [https://](https://doi.org/10.3390/coatings14040447)[doi.org/10.3390/coatings14040447](https://doi.org/10.3390/coatings14040447)

Received: 8 April 2024

Accepted: 8 April 2024

Published: 9 April 2024

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published literature and the experimental works that they perform. From an engineering point of view, we can consider a research project to be a sum of simpler problems that have to be solved; thus, problem solving is an important skill that permits us to carry out research in a more precise and punctual way.

### **3. When and How Did You Start Working with *Coatings*? What Prompted You to Submit Your Work to *Coatings*?**

The first time that I worked with *Coatings* was in 2019 thanks to a collaborative project within the Materials Science research group of the Department of Civil, Chemical, Environmental and Materials Engineering of the University of Bologna, Italy, where I was carrying out postdoctoral research. I collaborated with Dr. Enrico Sassoni, who, at that time, was a Marie Skłodowska-Curie Fellow of the HAP4MARBLE project (“Multi-functionalization of hydroxyapatite for the restoration and preventive conservation of marble artworks”) under the supervision of Prof. Elisa Franzoni. During the return phase of his project at the University of Bologna, he explored the possibility of applying the electrodeposition of calcium phosphates on marble surfaces to optimize the protection of cultural heritage. Using the expertise that I acquired during my PhD in electrochemical techniques for assessing the corrosion of metallic alloys, we collaborated to identify the best parameters for optimizing the surface coverage of electrodeposited calcium phosphate coatings in terms of the concentration of diammonium hydrogen phosphate solution, voltage, pulsing and the duration of the electrodeposition process. The experimental data that we produced were systematic and allowed us to demonstrate that electrodeposition can accelerate and improve the formation of calcium phosphate coatings on the marble surface by forming hydroxyapatite (HAP) characterized by a lower dissolution rate and solubility product compared to calcite, the main constituent of marble. Finally, due to it being mandatory to publish in open-access journals within the framework of European Union’s Horizon 2020 research and innovation program, we decided to publish the results of this study in *Coatings* in a paper titled “Electrodeposition of Hydroxyapatite Coatings for Marble Protection: Preliminary Results” by E. Sassoni, G. Masi, M.C. Bignozzi and E. Franzoni (<https://doi.org/10.3390/coatings9030207> (accessed on 1 April 2024)).

### **4. We Are an Open-Access Journal—How Do You Think That the Open-Access Model Impacts Readers and Authors?**

Nowadays, the entire scientific community is moving in the direction of open-access publishing. Thus, I think that in the next few years, it will be much more common to read and write open-access papers. Especially in Europe, where the European Union strongly urges researchers to use this model to publish the research results, there is now not only a strong push from scientific institutions and universities to use this method but also strong support from researchers. The reasons for this transition are clear, as the open-access model allows your research results to reach a large audience, better disseminating the scientific outputs published. I think that MDPI in general accelerated this transition by highlighting among scientific publishers the importance of open-access publications. Nowadays, many scientific institutions such as the University of Bologna have agreed to cover subscription fees to push researchers to publish in open-access journals. I consider this action crucial to supporting the transition toward Open Science, and I really appreciate the University of Bologna for always being first in line to integrate innovative, enthusiastic perspectives into its operating model.

### **5. What Do You Think Are the Main Points That Should Be Taken Seriously in the Process of Writing a High-Quality Research Paper?**

Firstly, when writing a high-quality research paper, I judge whether the scientific content and experimental data produced effectively demonstrate the aims and research findings about which I want to write. Another important step is to define and highlight the innovativeness of the research compared to the already-available literature. Thus, if the innovation level of the scientific content is high, you can be sure that the scientific

soundness will be considered in the publication phase, and you can strive to publish a high-quality paper. It is also important to check the obtained results' accuracy and choose the best form of representation (i.e., plots, figures and tables). This is crucial for evaluating whether your data are sufficient and of high enough quality to effectively describe the content of the paper. Before redacting different paper sections, I usually select the scientific journal to which I would like to submit the paper by checking the indexes and scores of the journal, as well as its scope and typical contents. This is crucial for tailoring the writing, especially for the Introduction section, as well as for selecting the most relevant technical language that reflects with the paper's scientific content and the selected journal.

## 6. Can You Briefly Describe the Key to a Happy Laboratory Life?

To enjoy the laboratory life, I think that it is vital to be collaborative with and respectful of everyone. Every person that we independently meet in education, work and our personal lives can enrich ourselves and our research. Thus, every chat, shared moment or collaborative project can give us some new ideas or some solutions to improve the implementation of the current project. It is also important to propose common situations such as informal group meetings; common social events inside and outside of laboratories, such as student graduation celebrations with sweets and toasts; and team lunches or dinners to ensure that we are familiar with all of our colleagues. To take these steps and, thus, experience positive feelings while working in a laboratory and make the laboratory an enjoyable environment, it is necessary to be an open-minded person, keen to share ideas and help the other people that you are meeting during a research project. It is not always easy to welcome colleagues who may be are strongly different from each other or competitive, but it is important to remember that working together is easier than working alone when managing a laboratory.

**Conflicts of Interest:** The author declares no conflict of interest.

## Short Biography of Author



**Giulia Mas** earned her PhD in Materials Engineering at the University of Bologna in 2018 through the framework of a European project (B-IMPACT funded by M.ERA.Net Transnational Call 2013) studying the development of protective coatings for protecting against outdoor corrosion of bronze heritage. She has previously worked as a visiting researcher abroad during a 7-month internship at the Geopolymer Centre Group of the Curtin University in Perth, Western Australia (2013), and 6-month visitation at the TRACES Laboratory of the University of Toulouse, France (2016 and 2017). During her postdoctoral studies (2017–2021) at the University of Bologna, she actively investigated different durability aspects of sustainable materials for construction and cultural heritage applications. She was involved in an Italian project (RAPCON, funded by Cariplo Foundation) studying the use of Reclaimed Asphalt Pavement for concrete aggregate production. Since 2021, she has worked as an assistant professor at the University of Bologna in the Materials Science laboratories led by Prof. M.C. Bignozzi. She is currently focusing on the development of sustainable binders obtained via the alkali activation of industrial waste in the construction field, in particular developing optimal mix designs for pressing and extruding forming techniques and investigating their durability via a multi-analytical approach. She is the author of more than 30 peer-reviewed article, with an h-index of 11 (Scopus database, March 2024).

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