



**Going Green:
Research into sustainable conservation practices for cultural heritage
metals**
**ERAMUS Exchange between IBN TOFAIL University (UIT) Kenitra,
Morocco and the University of West Attica (UNIWA), Athens Greece**

Prof. Vasilike Argyropoulos
Dept. of Conservation of Antiquities & Works of Art (UNIWA)



"For my part, my lab has also continued to test green materials to protect cultural heritage metals as a result of a funded national research project that studied cysteine as a corrosion inhibitor for copper alloys, as well as other new treatments for chloride removal from marine iron composite artefacts. Thus, my teaching focused on these two topics for the students. After each presentation, I was impressed by the barrage of interesting questions I received from the students related to my topic. It was then that I realized that these Master's students' knowledge came from a special course they were taught on the application of green corrosion inhibitors for cultural heritage metals. I found my interaction with the students to be stimulating, and I was able to provide them with real world application on the use of such inhibitors to cultural heritage objects."

During February 17-21, 2020, I set out for ERASMUS teaching of Master's students at the Faculty of Sciences at UIT University in Kenitra, Morocco. The Master's program is headed by Prof. Najat Hajjaji from the Dept. of Chemistry, whom I collaborated with 10 years ago on a four-year European project for developing new techniques and materials for cultural heritage metals. Prof. Hajjaji's research group has been very active in developing green corrosion inhibitors for conservation of metals. They have participated in many national and European projects and studied plant oils from seeds, as well as plant extracts that are commonly grown in the Mediterranean region as green corrosion inhibitors for metals cultural heritage. Prof. Hajjaji has supervised over 20 PhDs on the topic and has four patents on the green corrosion inhibitors developed from their research.



The examination committee along with Ms. Meryem Zouarhi on the day of her successful award of her PhD.

ERASMUS+/ICM



On February 20, 2020, I also participated on the examination committee as an external examiner for the PhD by Meryem Zouarhi. The topic of her thesis was concerning two plant extracts *Jatropha curcas* and *Aleurites moluccana*, as a corrosion inhibitors for iron in acid rain conditions. I was impressed at the thoroughness of the PhD research that used electrochemical techniques to assess these corrosion inhibitors for iron. The examination began with a 20 minute presentation by Ms. Zouarhi in front of the committee and an audience of around 100 people. Then each member of the committee asks Ms. Zouarhi a number of questions. At the end, the committee convened, giving Ms. Zouarhi a successful pass of her PhD.

I also carried out visits to museums and cultural sites in Morocco during my stay to understand better their cultural heritage. What impressed me the most was wealth of oils and other products derived from plant extracts that are developed and sold mostly by Moroccan women working in cooperatives.



The Master's students on the day of my teaching at the Dept. of Chemistry UIT University in Kenitra, Morocco.

In closing, my visit was successful in that we discussed ways to stimulate future research in the development of green corrosion inhibitors for cultural heritage metals through exchanges between academic staff and PhD students. The ERASMUS program is important to help kick start such collaborations and fund exchanges.