Supervisor Project Idea

Supervisor

Insert a brief CV and/or external link, the total number of publications, the ORCID link, 5 of the most significant/recent publications, and a list of funded projects and awards. max 300 words

Tiziano Bellezze is Associate Professor in Science and Technology of Materials. In 2021, he obtained the National Scientific Qualification to the function of Full Professor in this field. Tiziano Bellezze makes a didactic activity: in university courses on Corrosion and Materials; supervisor of BC, MD and PhD thesis in different Engineering fields. He gained an over 25 years' experience in studying corrosion and protection of metals. He is the head of corrosion laboratories. He is co-author of 81 indexed scientific publications (H-index 24) and in general 190 publications. He participated to different national and international projects. He had and has the responsibility of Department SIMAU, UNIVPM and companies' collaboration projects.

Detailed CV is in the personal UNIVPM web page: https://www.univpm.it/Entra/Ingegneria_1/docname/idsel/605/docname/TIZIANO%20BELLEZZE

Orcid: https://orcid.org/0000-0002-0220-5785

5 most significant publications:

1. Bellezze, T., Giuliani, G., Roventi, G., "Study of stainless steels corrosion in a strong acid mixture. Part 1: cyclic potentiodynamic polarization curves examined by means of an analytical method", Corrosion Science, 10.1016/j.corsci.2017.10.012.
2. Bellezze, T., Giuliani, G., Viceré, A., Roventi, G., "Study of stainless steels corrosion in a strong acid mixture. Part 2: anodic selective dissolution, weight loss and electrochemical impedance spectroscopy tests", Corrosion Science, 10.1016/j.corsci.2017.10.010.
3. Bellezze, T., Timofeeva, D., Giuliani, G., Roventi, G., "Effect of soluble inhibitors on the corrosion behaviour of galvanized steel in fresh concrete", Cement and Concrete Research, 10.1016/j.cemconres.2018.02.008.
4. Tittarelli, F., Mobili, A., Giosuè, C., Belli, A., Bellezze, T., "Corrosion behaviour of bare and galvanized steel in geopolymer and Ordinary Portland Cement based mortars with the same strength class exposed to chlorides", Corrosion Science, 10.1016/j.corsci.2018.02.014.
5. G. Roventi, T. Bellezze, G. Giuliani, C. Conti, "Corrosion resistance of galvanized steel reinforcements in carbonated concrete: effect of wet–dry cycles in tap water and in chloride solution on the passivating layer", Cement and Concrete Research, 10.1016/j.cemconres.2014.07.014.

Research Group Description

Provide the name the reference department and a brief description of the research group, including external links, and available instrumentations and infrastructures. max 300 words

The corrosion and protection of metal investigations are carried out in corrosion laboratories of the Department of Science and Engineering of Materials, Environment and Urban Planning (Dept. SIMAU), at the UNIVPM Engineering Faculty.

The research group is constituted by an Associate Professor (the Supervisor) and a Technician, both with a long expertise in the field, and supported by a PhD student. Furthermore, there is Full Professor, a Researcher, another Technician and a PhD student with a well-established experience in corrosion of reinforcements, particularly if galvanized, in concrete and mortars, like the Supervisor. Over the years, even a significant experience has been gained in the formulation of specific mixes with new binders as alkali activated ones, paying attention to the recycle of industrial by-products. Finally, in the research group there is another Full Professor and an Associate Professor with a long experience in the study of building materials, especially those cement-based, reinforced not only with rebars but also with fibres/fillers/yarns.

In the Department, there are laboratories where reinforced concrete/mortar specimens can be prepared and tested in terms of their mechanical, chemical-physical and microstructure properties.

Concerning the study of corrosion resistance of metals, specific equipped laboratories are available with different modern models of Potentiostats/Galvanostats for carrying out electrochemical measurements in DC (as polarization resistance) and AC techniques (as Electrochemical Impedance Spectroscopy), for accessing reinforcement corrosion rates and then the durability of reinforced structures. In addition, there are also active/passive devices for generation and acquisition of signals for monitoring the characteristic parameters involved in corrosion phenomena. Therefore, customized experimentations can be performed with the possible development of specific probe prototypes.

Carbonation and salt spray chambers are available for the exposure of concrete/mortar specimens in harsh environments, as well.

Here the link for more details on infrastructures and instrumentations: https://simau.univpm.it/scienza-e-tecnologia-dei-materiali-laboratori-dei-settori-tematici/

Title and goals

Provide the title of the topic and a short summary of the project idea. max 200 words

Assessing as accurately as possible the corrosion phenomenon of steel reinforcements embedded in concrete under different exposure conditions simulating field applications.
Considering the increasing interest of the scientific community on the degradation of the concrete structures, related to reinforcements corrosion, the project is addressed to improve the measurement methods to estimate their corrosion rate/status.
The research group has gained a certain experience in the polarization resistance measurements of rebars and in the estimation of their corrosion rate. On the contrary, significant efforts have never been dedicated to measurements performed by Electrochemical Impedance Spectroscopy, which gives the possibility to obtain more information, not only on the estimation of corrosion rates of the rebars but also on the corrosion mechanisms.
The project has the main objective to manufacture laboratory reinforced specimens to set up the measurement methods, interpretations and elaborations of data by using the typical approach based on equivalent circuits and/or developing new approaches.
The gained knowledge is necessary to pave the way for extending these measurements in real reinforced structures, by means of innovative solutions for assessing their degradation, reducing maintenance costs and, in particular, to prevent loss of human lives.

Contact details (*including email address of the supervisor*)

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