

# The Tribochemistry Award

Presented to

**Dr. Antonella Rossi**

In recognition of her outstanding contributions to tribochemistry by The Tribochemistry Technical Committee (Chair: Dr. Keiji Nakayama), Japanese Society of Tribologists (JAST) in September 2023 in at “Tribochemistry Beppu 2023”.



Dr. Antonella Rossi was born in Massa Marittima (Grosseto, Italy) and she was educated in Sardinia at the University of Cagliari where she graduated in Chemistry with honours in 1981. Her thesis work was in the area of corrosion inhibitors for Fe-based alloys and she was using electrochemical and surface-analytical techniques. In 1983 she was appointed as assistant professor at the University of Cagliari. After spending a research-leave period at the Institute für Physikalische Chemie und Elektrochemie, in Düsseldorf (D), where she collaborated on the development of a method for quantitative analysis of passive layers on FeNi alloys by ion scattering spectroscopy (ISS), she became associate professor of Analytical Chemistry at the University of Cagliari.

She has been full professor of Analytical Chemistry at University of Cagliari (Sardinia, Italy)

since 2001, leading the group of “Surface Analysis, Electrochemistry and Corrosion”.

In collaboration with several international research institutions her research activity has been concentrated on three closely interrelated directions:

- a. ***fundamental research***, using electrochemical and surface-analytical techniques dedicated to the study of thin oxide films (passive films) on crystalline, amorphous and nanocrystalline iron-based and brass alloys and of the surface modification through functionalization with organic molecules (self-assembled monolayers);
- b. ***methodological research***, Dr. Rossi has always dedicated special attention to the quality of surface-analytical results and their traceability, participating in international round robins and organizing one on “Microscopic and Spectroscopic Characterization of Planar, Nano-patterned, Multi-metallic Samples by XPS, ToF-SIMS and AES”. She is actively involved in the reconstruction of compositional depth profiles by angle-resolved XPS and ion sputtering using non parametric equations and the maximum entropy method (MEM). She exploited phosphate and borate glasses synthesised with various compositions for validating the correlation of frictional data with surface modifications. Results from XPS and XAES (X-ray Auger induced electron spectroscopy) were used to obtain a chemical-state plot as a fast and reliable method for the identification of the chemical environment of elements such as zinc and phosphorus.
- c. ***applied research***, exploiting tribological and surface-analytical techniques for the understanding of mechanisms of tribofilm growth and modification, simulating the high pressure and high temperature encountered in engineering applications. She actively participated in the development of an attenuated-total-reflection Fourier-transform infrared spectro-tribometer and of a methodology focused on the application of a spatially resolved surface-analytical approach for the characterization of surfaces under various tribological test conditions, such as contact pressure, test duration and temperature. The obtained results were related to the frictional data and the tribological conditions used for understanding and controlling the film properties.

More recently she has been leading projects on the development of innovative coatings for steels as hydrogen permeation barriers and on strategies for recyclable materials for water waste purification and reuse.

Since 2008 has been a member of the in the ISO TC 201 Surface Analysis Committee. She has a long teaching experience and multiple collaborations with many different European institutions. She is co-author of 200 scientific articles and she has presented a number of invited talks including keynote contributions to international conferences.

She is member of the steering committee of the European Association on Applications of Surface and Interface Analysis, of the Italian Chemical Society and of the International Advisory Board of the International Forum on Tribochemistry (Japanese Society of Tribologists) since 2008. She serves as the representative of the Italian Chemical Society for the chemistry division of the European Chemistry Society (EuChemS DivCED) and has been a senior (titular) member of the IUPAC committee on chemical education (CCE) since 2021. She has been a member of the national committee of the Italian Ministry of Universities for evaluating and assessing candidates' scientific qualifications in Analytical Chemistry (Associate Professors and Ordinary Professors) since July 2021. She has contributed to the ITC and WTC satellite forums on Tribochemistry as a member of the International Advisory Board for many years.

Dr. Rossi has contributed significantly to the development of tribochemistry through her pioneering research works, ranging from basic science to technologies, especially by developing new, outstanding original methodologies for analyzing the surfaces and interfaces within tribofilms.

Dr. Rossi is indeed a worthy recipient of the world's highest honor in tribochemistry – The Tribochemistry Award for 2023.