MARIO MINALE

Mario Minale is Full Professor of Chemical Engineering (Principles of Chemical Engineering ING-IND/24).

He is graduated and Ph.D in Chemical Engineering. He was the recipient of 3 undergraduate awards and 2 laurea dissertation prizes.

Commitment for scientific societies

2021-2023: President of the European Society of Rheology.
2020- : Vice-president of the Italian society of Rheology - SIR
2019-2023: Vice-president of the European Society of Rheology.
2016- : Member of The International Committee of Rheology – ICR
2016 - : Member of The European Society of Rheology Committee
2016 - : Member of the executive board and International delegate of the Italian Society of Rheology – SIR
He is member of the Society of Rheology (USA), the European Society of Rheology, the Italian Society of Rheology-SIR, the British Society of Rheology, GRICU.

Awards

2008 - nominated for the American Chemical Society award: "Langmuir Lectureship".
1998 - recipient of the young researcher award for the best presentation at GRICU Conference.

Keynote or Plenary Lectures

2023 – Invited keynote plenary lecturer at "*International Conference on Materials & Energy (ICOME)*", Caserta 30 May-I June 2023.

2023 – Invited lecturer at "*INNFM-BSR Meeting on Non-Newtonian Fluid Mechanics, In celebration of 30 years of the INNFM & Prof. Ken Walters' extensive contributions to the field of Rheology*", Lake Vyrnwy, Wales April 3rd – 5th 2023.

2021 – Invited Keynote Lecturer at *VIII Escuela de Verano 2021: the role of conventional resources in Energy Transition*", Virtual, 02-04 June 2021.

2019 – Invited Plenary Lecturer at: "*ic-rmm4 - 4th International Conference on Rheology and Modeling of Materials"* Miskolc-Lillafüred, HU, 7-11 October, 2019.

2019 – Invited Keynote Lecturer at: *VII Escuela de Verano 2019: Nuevas Tecnologías en Productividad y Recobro Mejorado de Petróleo y Gas*", Medellin (Colombia) 29-31 May 2019.

2011 – Invited Lecturer at the opening ceremony of the Universiteti Metropolitani Tirana– Tirana, Albany, 31 ottobre 2011.

2009 – Keynote lecturer at the "*Annual European Rheology Conference – AERC2009"* – April 15-17 2009 – Cardiff, Wales, UK

International Conference Organizations

2022 - Chairman of the Session "Emulsions, Foams and Interfacial Rheology" of the 15th Annual European Rheology Conference AERC 2022 of the European Society of Rheology 26-28 April 2022 Seville - Spain

2021 - Chairman of the Session “Multiphase and other complex fluids” of the 14th Annual European Rheology Conference AERC 2021 of the European Society of Rheology, Cyberspace.
2018 - Chairman of the 12th Annual European Rheology Conference AERC 2018 of the European Society of Rheology 17-20 April 2018, Sorrento (Naples).
2016 - Member of the International Advisory Board of the XVII International Congress on Rheology ICR2016 in 8-12 August 2016, Kyoto, Japan.
2012 Member of the International Advisory Board of the XVI International Congress on Rheology ICR2012 in 5-10 August 2012, Lisbon, Portugal.
2007 Member of the organising committee of the 12th Annual European Rheology Conference AERC2007 – April, 2007 Naples, Italy.

Editorial activities
2022 – Associate Editor of “Frontiers in Soft Matter”
2021 – : Member of the Editorial Board of “Processes”
2021 – 2022: Review Editor of “Frontiers in Soft Matter”
2008 – 2015: Co-editor of Panta Rei: the bulletin of SIR
2007 Co-guest Editor: of a Special Issue of the International Journal of Environmental Technology and Management, vol. 7, issues 1/2.

Research Activity
Mario Minale is author of more than 160 publications on international Journals, books and on proceedings or books of abstracts of scientific conferences. Many of these papers are the result of collaboration with leading international groups and most of his activity has been focused on the rheology of heterogeneous systems.
In the recent years Mario Minale studied that the non-Brownian suspensions and he was able to numerically demonstrate the existence of a single steady state in simple shear flow for suspensions in the semidilute regime. Moreover, he investigated numerically and experimentally the mechanisms at the basis of the failure of the Cox-Merz rule even for Newtonian suspensions and finally he showed that under oscillatory shear the response of Newtonian Suspensions is also function of the frequency even if the steady state behaviour remains rate independent. This was not predicted by the accepted theories developed to study the dynamics of these systems and he proved that a small van der Waals force is the missing ingredient necessary to explain the experimental observations. This van der Waals force also introduces a new frequency-dependent threshold for irreversibility that was predicted numerically and measured experimentally. He is currently studying non-Brownian suspensions made of irregular and porous particles or by slightly deformable particles with the goal of the investigation of the tire powder recycle.
Recently the effect of the degree and molar substitution of a HPMC on its reversible thermogelation and syneresis was investigated. The addition of cellulose nano crystals to the HPMC was also investigated to modulate both the drug release and syneresis properties.
He also studied the incompatible polymer blends both experimentally and theoretically. One of the most relevant experimental results in this field is the observation of the morphological hysteresis that a dilute or semidilute immiscible blend experiences in simple shear flow. The hysteresis was indirectly observed with rheological experiments, and it was also interpreted and modelled. Subsequently, the phenomenon was also characterised experimentally by varying the parameters of the system thus validating different drops coalescence theories. More generally, the interplay between flow and morphology of a polymer blend was investigated rheologically.
Concerning the theoretical side the most relevant result is the development of phenomenological models for the dynamics of a single drop immersed in viscous matrix subjected to a generic flow

field. The first model focused on Newtonian systems, where both fluids, drop and matrix, are Newtonian. The model assumes that an initially spherical drop deforms into an ellipsoid of the same volume, thus neglecting both break-up and coalescence phenomena. The model inspired a large number of other models and theories developed to predict the dynamics of a single drop or of a dilute blend. Successively, also the dynamics of a non-Newtonian drop immersed in a non-Newtonian matrix was modelled and the effect of confinement on the dynamics of both the Newtonian and the non-Newtonian systems was successfully described. The stress developing in a dilute blend was predicted based on drop deformation as obtained from the phenomenological models. In addition, the dynamics of a blend undergoing flow reversal was first observed rheologically, then observed optically, and finally interpreted with the phenomenological model.
The stress-induced demixing of a polymer solution was also investigated and modelled by means of a new reformulation two-fluid theory. More recently Mario Minale investigated the flow through a porous medium with a new technique based on rheological measurements and he modelled the problem leading to a new boundary condition at the interface between a porous medium and a free fluid, either Newtonian or not. The approach allowed to define a correct way to use rough geometries in rheometrical measurements. Crude oils attracted his attention in particular their rheological behaviour under the action of solvents, additives and nanoparticles.
Finally, he was involved in the innovative study of the manure anaerobic digestion to maximize the H_2 yield. He also investigated the beneficial effects in terms of NOx emissions when such a biogas is fuelled to a HCCI engine. The wettability characteristics of a soot nanofilm in-flame deposed was also investigated with the goal of recovering the pollutant “soot” to produce surfaces with variable and tuneable wettability.

Bibliometric parameters

Bibliometric parameters calculated from Scopus and/or ISI Web of knowledge
Total number of documents = 70; h-index = 23; he received more than 1550 citations with an Average Citations per item = 23 (Scopus).