UNIVERSITÀ
POLITECNICA
DELLE MARCHE

Supervisor: Prof. Giovanni Di Nicola

Dept. of Industrial Engineering and
Mathematical Sciences (DIISM)

Research Interests and Expertise

My research focuses on thermophysical properties of fluids, energy systems and industrial thermodynamics, with particular emphasis on the experimental measurement, modelling and correlation of thermodynamic and transport properties of pure fluids and mixtures. These studies support applications in energy conversion processes, refrigeration, sustainable fuels and bioenergy systems.

My work combines experimental investigations with thermodynamic modelling, providing reliable data and predictive tools for engineering applications.

Over the years, my research has resulted in more than 170 peer-reviewed publications (h-index 33, >3,100 citations) and highly cited contributions in the field of energy and thermophysical properties.

Funded Research Projects

I have been involved in several national and international research projects in the areas of thermophysical properties, energy systems and sustainable fuels, collaborating with universities, research institutions and industrial partners.

These projects have addressed topics such as experimental measurement and modelling of thermodynamic and transport properties of fluids, thermophysical characterization of biofuels and renewable energy carriers, process analysis and optimization for biodiesel production, applications of thermodynamic data to industrial energy systems.

Through these activities, I have developed extensive experience in coordinating research activities, supervising young researchers and managing collaborative projects in international research environments.

Positions of Responsibility

Deputy Head (Vice Director), Department of Industrial Engineering and Mathematical Sciences, Università Politecnica delle Marche (since November 2020);

Coordinator of the PhD Programme in Industrial Engineering, Università Politecnica delle Marche (March 2019 – May 2024);

Member of the PhD Board in Engineering Sciences / Industrial Engineering, Università Politecnica delle Marche (since 2009);

Member of the Doctoral Board, Vilnius Gediminas Technical University;

Member of Commission B1 (Thermodynamic and Transport Properties), International Institute of Refrigeration (2011–2019);

Editorial board member of several international journals and former Associate Editor of the *International Journal of Thermophysics*.

Patent

Co-author of a patent for industrial invention filed on 3 March 2022 entitled:
“Kit for the construction of a box-type solar oven and related box-type solar oven.”

Mentorship Activities

Supervision of 10 PhD students (since 2006).
Supervision of 3 postdoctoral research fellows.
Supervision of more than 300 Bachelor’s and Master’s theses.

ORCID and Bibliometric Indicators

ORCID: 0000-0001-9582-8764
h-index: 33
Total citations: 3,877
Total publications: 174

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Staff, equipment and laboratories

The Thermodynamic Properties of Fluids Laboratory is used to measure pvTx and solid–liquid equilibrium (SLE) properties of various types of fluids, including environmentally friendly refrigerants, using dedicated experimental apparatus. The experimental data obtained are used to develop accurate mathematical models for the determination of fluid thermodynamic properties, such as equations of state.

The Solar Energy and Low-Tech Systems Laboratory focuses on the experimental characterization of solar thermal collectors. In particular, the research investigates the thermal performance of solar cookers, thermodynamic systems that convert solar energy into thermal energy for food heating and cooking. Solar cookers are characterized through outdoor no-load tests to determine the maximum achievable temperature. Load tests with water (or other test fluids such as natural or diathermic oils) are also performed to determine characteristic boiling times, cooking power, and the optical and thermal efficiency of the cooker. Additional experiments involve thermal storage systems based on Phase Change Materials (PCM), which exploit latent heat to enable the use of solar cookers even during periods of low or absent solar radiation. The laboratory is equipped with a temperature acquisition system using thermocouples, pyrheliometers, and pyranometers to measure direct solar radiation.

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HR EXCELLENCE IN RESEARCH

STAFF

- **Prof. Giovanni Di Nicola, g.dinicola@staff.univpm.it**
- **Prof. Gianluca Coccia, g.coccia@staff.univpm.it**
- **Dr. Sebastiano Tomassetti, s.tomassetti@staff.univpm.it**
- **Emma Di Bartolomeo, PhD student, e.dibartolomeo@pm.univpm.it**
- **Martina Aoife Greenwood, Phd student, m.greenwood@pm.univpm.it**

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Project idea

I am particularly interested in the development and in-depth analysis of solar thermal technologies that are designed to provide multiple essential services in remote and off-grid areas.

My focus includes applications that go beyond traditional energy provision, encompassing clean cooking solutions that reduce reliance on polluting fuels, refrigeration systems to support cold chains and preserve perishable goods, and thermal processes that enable safe water purification and desalination.

I am especially motivated by the potential of these technologies to improve quality of life, enhance resilience, and promote sustainable development in communities with limited access to conventional energy infrastructure.

Based on these premises, I am open to discussions with potential candidates in order to define a more specific and interdisciplinary line of research together.

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