Full Name Vittorio MORANDI	**Rank / Professional Title** Research Director Director of CNR-ISMN	**Institutional Affiliation** Institute for Nanostructured Materials (ISMN) – National Research Council (CNR)

Personal Statement

From a general point of view, his research activities concern the development of advanced electron microscopy techniques, both in transmission (High Resolution Transmission Electron Microscopy (HRTEM) Scanning Transmission Electron Microscopy (STEM), Energy Dispersive X-Ray Microanalysis (EDX), Electron Energy Loss Spectroscopy (EELS), Electron Holography) and in scanning mode, their application to the study of micro- and nanomaterials, and the synthesis, characterization, and technological processing and integration of graphene and graphene-based materials.

The most important achievements has been related to: the study of image formation mechanisms in Scanning Electron Microscopy (SEM), with the definition of a new interpretation scheme for backscattered, secondary and transmitted electrons imaging; the study and development of imaging modes and detection solutions in scanning transmission mode both in the SEM and in the TEM, in particular with the development of a new class of detectors for STEM imaging in the SEM; the structural and compositional characterization of graphene-based materials with high resolution TEM-based techniques, with particular focus on interferometric methods based both on HRTEM and Electron Holography, to determine the properties related to the curvature at the nanoscale; more recently, the development of Chemical Vapor Deposition synthesis of graphene materials, with particular focus on 3D structures (graphene foams) and the integration of graphene membranes in devices and in CMOS compatible technological processes.

Education (highest level achieved)

PhD in Physics at University of Bologna (Italy)

Career History

2024 – present: Director of CNR Institute for Nanostructured Materials (ISMN)
2023 – present: Chair of EuroNanoLab
2022 – present: President of the CNR Research Area of Bologna (https://area-new.bo.cnr.it/en)
2022 – present: Coordinator of the Research Infrastructure "Infrastructure for Energy Transition and Circular Economy @ EuroNanoLab" (iENTRANCE@ENL) (https://www.ientrance.eu)
2019 – present: Member of the Board of the PhD Course in "Physics" at the University of Bologna
2019 – 2023: Vice-chair of EuroNanoLab
2017 – present: Coordinator of It-fab (https://itfab.bo.imm.cnr.it), Italian node of EuroNanoLab
2016 – 2023: Adjunct Professor at the University of Bologna, Department of Physics and Astronomy
2016 – present: member of the Steering Committee of EuroNanoLab (http://euronanolab.eu), distributed infrastructure for micro- and nano-fabrication
2015 – present: Scientific Coordinator of Graphene Factory (http://grafene.cnr.it)
2015 – 2024: Deputy Director of CNR-IMM, Section of Bologna

Research / Technology Development Track Record

Main Research projects over the past five years include:

- PNRR Project "**Infrastructure for Energy Transition and Circular Economy @ EuroNanoLab**" **(iENTRANCE@ENL)**, financed for a total of 75.2 M€ within the framework of the PNRR Projects financed with EU Next Generation funds – Role: Project Coordinator

- HORIZON EUROPE INFRA-SERV Project (EU Project) **"RIANA"** – Duration 2024-2028 – Grant Agreement: 101130652 – Role: Member of the General Assembly and EuroNanoLab coodinator
- HORIZON EUROPE INFRA-DEV Project (EU Project) **"IMPRESS"** – Duration 2023-2027 – Grant Agreement: 101094299 – Role: Work Package Leader
- HORIZON EUROPE INFRA-EOSC Project (EU Project) **"FAIR-Impact"** – Duration 2022-2025 –- Grant Agreement: 101057344 – Role: CNR-IMM Unit Leader
- H2020 NMBP Project (EU Project) "**CHALLENGES – Real-time nano-CHAracterization reLatEd techNloGiEeS"** – Duration 2020-2023 – Grant agreement: 861857 - Role: Work Package Leader
- H2020 NMBP Project (EU Project) **"NanoFabNet – International Hub for sustainable industrial-scale Nanofabrication"** - Duration 2020-2023 – Grant agreement: 886171 - Role: CNR Unit Leader
- H2020 Future Emerging Technologies Flagship (EU Project) – **"Graphene Flagship Core Project 3"** - Duration: 2020-2023 – Grant agreement: 881603 - Role: CNR-IMM Unit Leader

3 patents on "Device and realization method of luminescent solar concentrators based on silicon nanostructures", "Three-dimensional materials based on graphene oxide (GO)", "Detection device for electron microscope"

Publications

He co-authored about 200 papers on peer-reviewed international journals of physics, material science and chemistry, with more than 8000 citations (h-index = 47, source Google Scholar, h-index = 41, source Scopus). He has participated to about 50 international conferences with more than 150 oral and poster contributions, on, among others, SEM, STEM, graphene characterization and exploitation. ORCID: http://orcid.org/0000-0002-8533-1540 - Researcher ID: C-1322-2013 - Scopus Author ID: 6603662672

Selected Publications (10 most relevant):

1. P. Greco et al. "Conductive sub-micrometric wires of platinum-carbonyl clusters fabricated by soft-lithography" Journal of the American Chemical Society 130 (4), 1177-1182 (2008)
2. L. Ortolani et al. "Folded graphene membranes: mapping curvature at the nanoscale" Nano letters 12 (10), 5207-5212 (2012)
3. Z.Y. Xia et al "The exfoliation of graphene in liquids by electrochemical, chemical, and sonication-assisted techniques: A nanoscale study" Advanced Functional Materials 23 (37), 4684-4693 (2013)
4. A.C. Ferrari et al. "Science and technology roadmap for graphene, related two-dimensional crystals, and hybrid systems", Nanoscale 7 (11), 4598-4810 (2015)
5. S. Haar et al. "A Supramolecular Strategy to Leverage the Liquid-Phase Exfoliation of Graphene in the Presence of Surfactants: Unraveling the Role of the Length of Fatty Acids" Small 11 (14), 1691-1702 (2015)
6. L. Jin et al. "Engineering interfacial structure in "Giant" PbS/CdS quantum dots for photoelectrochemical solar energy conversion", Nano Energy 30, 531-541 (2016)
7. M Döbbelin et al. "Light-enhanced liquid-phase exfoliation and current photoswitching in graphene–azobenzene composites" Nature communications 7 (1), 1-10 (2016)
8. G. Bepete et al. "Surfactant-free single-layer graphene in water". Nature chemistry 9 (4), 347-352 (2017)
9. C. Backes et al. "Production and processing of graphene and related materials", 2D Materials 7 (2), 022001 (2020)
10. G. Solomon et al. "Decorating vertically aligned MoS2 nanoflakes with silver nanoparticles for inducing a bifunctional electrocatalyst towards oxygen evolution and oxygen reduction reaction", Nano Energy 81, 105664 (2021)

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