

Marie Skłodowska Curie Individual Fellowship 2020 Expression of Interest for hosting Marie Curie Fellows

1. Supervisor (name and e-mail address)

Alberto Salvadori
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2. Department (name and address)

Dipartimento di Ingegneria Meccanica e Industriale (DIMI)
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25123 Brescia
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3. Panel (choose one)

- Chemistry (CHEM)
- Social Sciences and Humanities (SOC)
- Economic Sciences (ECO)
- Information Science and Engineering (ENG)
- Environment and Geosciences (ENV)
- Life Sciences (LIF)
- Mathematics (MAT)
- Physics (PHY)

4. Description of your research activities (max 10 lines)*

Projects and studies at the Multiscale Mechanics and Multiphysics of Materials Lab (<https://m4lab.unibs.it>), often in cooperation with companies (BMW, Abaqus Simulia, Bosch, Eldor, Copan, FV) or with international institutions (too many to quote here) cover a broad spectrum of modern and complex problems of social and industrial interest. They are rooted in the so-called white-economy (with great efforts in mechanobiology in collaboration with the group of biology at UNIBS) and green-economy (with special emphasis on the multi-physics of batteries, fuel cells, CO₂ sequestration, underground gas storage). Case studies range from the swelling and fracturing in energy storage materials, to bio-chemo-mechanical effects in cells and living tissues, from fracture propagation in solids embrittled by different mechanisms, to data-driven high performance computations of effective properties of granular materials at different strain rates. You will find some examples at <https://m4lab.unibs.it>

5. Key-words

Mechanobiology, Li-ion batteries, fuel cells, FEM, multiscale, multiphysics.

6. Short CV of the supervisor (max 5 lines)

Alberto Salvadori received his Ph.D. degree in Engineering Science from Politecnico di Milano, in 2000. At present, he is Associate Professor at the University of Brescia. He has been Research Assistant Professor at the University of Notre Dame, USA, and recipient of a Marie-Curie IEF fellowship, that he spent at the Technical University of Eindhoven. He founded the m4lab and is currently Director of the CeSiA at the University of Brescia. Scientific facts at ORCID 0000-0002-4875-7059

7. List of 5 main publications of the supervisor

1. V Damioli, A Salvadori, GP Beretta, C Ravelli, S Mitola, Multi-physics interactions drive VEGFR2 relocation on endothelial cells, *Scientific Reports* 7, Article number: 16700 (2017)
2. Salvadori A., McMeeking R., Grazioli D., Magri M., A coupled model of transport-reaction-mechanics with trapping. Part I - small strain analysis., *Journal of the Mechanics and Physics of Solids*, Volume 114, May 2018, Pages 1-30
3. Salvadori A., Fantoni F., Fracture propagation in brittle materials as a standard dissipative process: general theorems and crack tracking algorithms, *Journal of The Mechanics and Physics of Solids*, 95, (2016), 681–696
4. Salvadori A., Grazioli D., Geers M.G.D., “Governing equations for a two-scale analysis of Li-ion battery cells”, *International Journal of Solids and Structures*, 59 (2015) 90–109
5. Salvadori A., Bosco E., Grazioli D., “A computational homogenization approach for Li-ion battery cells. Part 1 - Formulation”, *Journal of the Mechanics and Physics of Solids*, 65 (2014) 114–137

*Please consider that the preparation of a Marie Curie proposal requires some time. Fellow and supervisor have to agree on a project and training opportunities for the fellow.