

# Super-Insulating Materials Enhanced with Aerogels for High-Performance Building Systems

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## Abstract

The possibilities opened by new superinsulating materials for high-performance building facade systems are limitless and still largely unexplored. This presentation will present some of the most advanced aerogel-enhanced building materials available to support a transitioning of the building sector towards high-performance energy-efficient buildings. Products with granular and monolithic aerogels will be presented; these will include aerogel blankets and aerogel-plasters, gypsum boards, foams, window frames and coatings.

## Biography of Presenting Author



**Umberto Berardi** is currently the Director of the Sustainable Building Research Center at the Wollongong University in Australia, where he is also a Full professor in the School of Engineering & Information Sciences. Dr. Berardi is also an Associate Professor and the Director of the BeTOP lab and group at Ryerson University in Toronto (Ontario, Canada), and has been Nominated as a Canada Research Chair in Building Science for the period 2020-2025.

His main research interests are related to the study of innovative solutions and new materials for improving the performance within the built environment. In the first years of his career, Dr. Berardi often worked on natural materials for acoustic applications and sustainable design through natural materials. Recently, he has been focusing on integrating nanotechnologies into building systems. He has mainly focused on organic PCMs, such as paraffin and bio-PCM, and granular and monolithic aerogel.

Dr. Berardi has an extensive publication record, including 100 peer-reviewed journals, 100 international conference papers, and five books. Notable highlights include 4 articles in *Renewable & Sustainable Energy Reviews* (2018 Impact Factor: 10.556); 3 in *Applied Energy* (IF: 8.426); 1 in *Chemical Engineering Journal* (IF:8.355); 1 in *Environment international* (IF: 7.943); 1 in *Resource Conservation and Recycling* (IF: 7.044); 1 in *Journal of Cleaner Production* (IF: 6.395); 1 *Business Strategy and Environment* (IF: 6.381); 2 in *Energy* (IF: 5.537); 1 in *Science of the Total Environment* (IF: 5.589); 1 in *Environmental Research* (IF: 5.026); 1 in *Energy Policy* (IF:4.880); 4 in *Building and Environment* (IF: 4.820); 3 in *Sustainable Cities and Society* (IF: 4.624); 18 in *Energy and Buildings* (IF: 4.495); and 1 in *Applied Thermal Engineering* (IF: 4.026).

Dr. Berardi's publications have received over 6000 citations in Google Scholar, where he has an h-index of 34, while the Scopus database counts over 3500 citations and an h-index of 30. He is the author of the most read paper ever in *Architectural Science Review*; the most cited and most-

read paper in the journal *Resource Conservation and Recycling* in 2019; the most cited and most-read paper in the *International Journal of Sustainable Building Technology and Urban Development*; the most cited paper in *Sustainable Development*; the second most cited paper in the journal *Sustainable Cities and Society*; one of the ten most downloaded articles in *Renewable and Sustainable Energy Reviews* in 2014. At the International Conference on Applied Energy in 2016 in China, he was awarded as the author of *one of the ten most cited papers* in the journal *Applied Energy*.

Dr. Berardi was the Chair of the conference X IAQVEC 2019 (*10th Int. Conference on Indoor Air Quality, Ventilation and Energy Conservation in Buildings*) in Bari, Italy, which attracted 400 attendees from 90 countries. Moreover, he was the International Committee Chair of the International Conference on Sustainable Design, Engineering and Construction ICSDEC 2016 in Tempe (Arizona), and the Technical Program and Leadership Committee Chair of ICSDEC 2015 in Chicago (Illinois). He has been a member of the scientific committee of over 40 international conferences in 30 countries, has often chaired special sessions and given plenary keynotes at many conferences.

Dr. Berardi contributes to several academic and scientific communities. He is the Editor-in-Chief of the Journal *Canadian Acoustics*, and he has been the editor of several special issues for journals such as *Energy and Buildings* (twice), *Journal of Building Performance Simulation*, *Science and Technology for the Built Environment*, *Building Simulation*, *Sustainable Cities and Society*, *Buildings*, *Sustainability*, and *Advances in Mechanical Engineering*. He is a member of the editorial board of the following journals: *Energy and Buildings*, *Sustainable Cities and Society*, *Journal of Building Performance Simulation*, *Building Simulation*, *Sustainable Development*, *Intelligent Building International*, *Buildings*, *Sustainability*, and *Energy and Policy Research*. He has acted as a reviewer for over 100 journals and has been recognized as an Outstanding Reviewer for over 20 journals, including *Building and Environment*, *Energy and Buildings*, and *Sustainable Cities and Society*.

His awards include (among others): Young Researcher Award by the AIGE in 2019; Early Research Career Excellence Award, Ryerson University, 2018; the Best Italian Engineer in North America award by the ISSNAF (Italian Scientists and Scholars in North America Foundation) in Washington in October 2016; the Best Technical Award in the NESEA competition for the Zero Energy Repeatable Apartments Project in Boston in March 2014.

Dr. Berardi has a body of funded research comprising over \$1.5 M in government and private sector sponsored research. He has been awarded a Canada Foundation Innovation-JELF; NSERC Discovery Grant; Early Research Award from the MRI - Ontario; Building Excellence Research Grants from the BC Housing - Homeowner Protection Office; OCE-VIP projects; multiple Ryerson Research Fund for Tools, and several NSERC Engages.

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