GEOCOND

Workshop on the technological advancements in cement additives for renewable and sustainable thermal energy storage

9:30-12:30, January 12, 2021
Istanbul, Turkey

Sabanci University Integrated Manufacturing Technologies Research and Application Center &Composite Technologies Center of Excellence, Istanbul, Turkey

Register in advance for this meeting:
https://sabanciuniv.zoom.us/meeting/register/tJEod-yrqj4vGtXaFa5wqqdxC0mzFPjONDfB

The scope of workshop:
The GEOCOND (Advanced materials and processes to improve performance and cost-efficiency of Shallow Geothermal systems and Underground Thermal Storage) project, with a unique consortium of Companies and leading Research Institutions in the area of SGES and Materials, focuses on four key development areas in a synergetic and system-wide approach: development of new pipe materials, advanced grouting additives and concepts, advanced Phase Change Materials and system-wide simulation and optimization. This workshop covers the suitable selection of carbon-based materials (graphite, graphene and carbon-by-products from waste sources) and Phase Change Materials (PCM) and the development of silica-carbon based hybrids by tailoring surface composition to improve the thermal conductivity and provide homogeneous suspensions in grout mixes. The interfacial interactions between carbon-based additives and grout constituents are explained by providing understanding the importance of surface chemistry. In addition, this workshop explains the properties of organic PCM and how they work allowing storage of thermal energy in the form of latent heat. The participants are able to understand the motivation of using PCM in SGE applications, diversity of PCM, why it is important to impart shape stability to organic PCM, how it can be done and how it was done actually within GEOCOND project framework, the considerations of importance in engineering and manufacturing Shape Stable PCM. Furthermore, the assessment of market potential of GEOCOND's developed additives, route to the market, market drivers and the importance of circular economy in cement industry are analysed from an industrial point of view.

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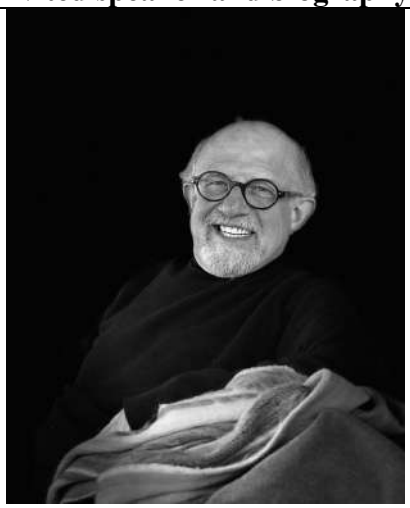
Program:

Duration	Time	Description
15 min	**9:30-9:45**	Welcome and short introduction (Assoc. Prof. Burcu Saner Okan and Prof. Yusuf Menceloglu and Prof. Dr. Bahattin Koc (the director of SUIMC), Prof. Javier F. Urchueguia-GEOCOND's coordinator)
15 min	**9:45-10:00**	GEOCOND project: Key features and Technological Advancements (Jose Manuel Cuevas Castell -GEOCOND's technical manager)
30 min	**10:05-10:30**	Development of carbonaceous hybrid additives from virgin and waste sources for thermally enhanced grouts (Assoc. Prof. Burcu Saner Okan-SUIMC)
10 min	**10:30-10:40**	Break
30 min	**10:40-11:10**	Phase Change Materials in groutings for the enhancement of the thermal storage capacity (Dr. Michael Shuster-Carmel Olefins)
30 min	**11:10-11:40**	Market potential of cement-based grouts in geothermal applications (Ayten Caputcu-Cimsa)
10 min	**11:40-11:50**	Break
30 min	**11:50-12:20**	Energy Efficiency as a Transdisciplinary Concept: Research and Applications, Prof. Dr. Pınar Menguc, Director of Centre for Energy, Environment and Economy; Ozyegin University, İstanbul
10 min	**12:20-12:30**	Concluding remarks (Assoc. Prof. Burcu Saner Okan)

Invited speaker and biography:



Professor M. Pinar Mengüç received his BS and MS from ODTU/METU in Ankara, Turkey and his PhD from Purdue University, USA in 1985, all in Mechanical Engineering. The same year, he joined the University of Kentucky (UK), and promoted to the ranks of associate and full professor in 1988 and 1993, respectively. He was a visiting professor at Università degli Studi di Napoli Federico II, Italy during 1991 and at Harvard University, Cambridge, Massachusetts, during 1998-99 academic year. He was awarded an Honorary Professorship at ESPOL, Ecuador in 2006. At the end of 2008, he was promoted to Engineering Alumni Association Chair Professor at the University of Kentucky; he still carries this Chair title at Emeritus level. He joined Özyeğin University, Istanbul in 2009 as the founding Head of Mechanical Engineering. The same year, he established the Centre for Energy, Environment and Economy (CEEE/EÇEM), which he is still directing.

Mengüç's research areas include radiative transfer, nano-scale transport phenomena, applied optics and sustainable energy applications. His research programs been funded by more than 60 research projects from several agencies in the US, in Europe and in Turkey. Over the years, he has guided more than 65 MS and PhD students and more than 15 post-docs and visiting researchers. Among them, eleven of the students he has guided are now teaching faculty members around the World. He is the author/co-author of more than 150 archival papers, 200 conference publications, more than 20 popular-press writings, three books, and several book chapters. He is one of the three Editors-in Chief of *Journal of Quantitative Spectroscopy and Radiative Transfer* (JQSRT), an Honorary Editorial Member of *Journal of Enhanced Heat Transfer*, and an Editor of *Physics Open*. He holds six patents and has two patent applications.

Mengüç is an elected member of Science Academy of Turkey, a fellow of both ASME (American Society of Mechanical Engineering) and ICHMT (International Center for Heat and Mass Transfer), and a Senior Member of OSA (Optical Society of America). Mengüç, along with his start-up company STI, was honored with the *R&D100 Award* in 2005 based on a particle characterization technique they developed. Recently, he was presented two life-long achievement awards: in 2018 he received the *ASME Heat Transfer Memorial Award* in the category of Art, and in 2020 he was chosen as an Outstanding Mechanical Engineer by the Purdue University School of Mechanical Engineering.

Speakers' biographies

Assoc. Prof. Dr. Burcu Saner Okan received her BS degree in Chemistry at Middle East Technical University (METU), Turkey in 2005. Dr. Saner Okan received MS degree in 2007 and PhD degree in 2011 in Materials Science and Engineering programme at Sabanci University. She worked as a researcher at Sabancı University Nanotechnology Research and Application Center for five years. Now she is research-oriented faculty member at Sabanci University Integrated Manufacturing Technologies Research and Application Center. Dr. Saner Okan is also co-founder of NANOGRAFEN Nano Technological Products Company. She conducted several national and international projects for the development of nanoparticles and nanocomposites. She has 30 articles published in international journals, 2 book chapters and more than 50 conference papers on these fields and 2 patents.

Prof. Dr. Javier F. Urchueguía Schölzel graduated in Theoretical Physics from the University of Valencia and Doctor of Physical Sciences from the Polytechnic University of Valencia (UPV), his career as a researcher has been focused on areas such as energy (alternative internal combustion engines, cooling and heat pumps, geothermal heat pumps, energy mejora techniques in building...) and biological engineering. He began his professional career in 1988, until reaching, in 2003, the place of Full Professor in the Department of Applied Physics of the UPV. During his career as a researcher, he has participated in more than 80 projects and research contracts with the administrations (autonomous, national and European) of which he has been principal investigator in twenty of them, has directed more than 30 end-of-career projects and DEA, directs or has directed 20 doctoral theses and has been organizer of more than 30 congresses, symposia or scientific meetings. Professor Urchueguía is the author of more than 90 research articles in indexed international journals and more than 150 publications in research congresses, national and international. Specifically, in the area of geothermal, Javier Urchueguía is currently Chairman of the European Geothermal Panel and a Chairman of the European Platform of Renewable Heating and Cooling (www.rhc-platform.org),all based in Brussels.

Prof. Dr. Yusuf Z. Menceloglu currently works as the Faculty Member of Engineering and Natural Sciences (FENS) Faculty at Sabanci University and affiliated with SU IMC. He is also the founder and partner of technology based startup companies and serves on the boards of associations and civic societies. Prof. Menceloglu received the B.Sc degree in Chemistry from Karadeniz Technical University, Trabzon, Turkey, in 1983. He completed his Masters and Doctorate degree in Polymer Science from Istanbul Technical University 1987 and 1991, respectively. He worked as visiting scientist at Tokyo Institute of Technology 1988-1989 and University of North Carolina-Chapel Hill, 1991-1994, and he moved to industry (Textile Performance Chemicals) and served there six years before joining the Sabanci University.

Prof. Dr. Bahattin Koç is the Director of SU IMC and Professor of Manufacturing and Industrial Engineering at the Sabancı University. He received his Ph.D. and M.S. degrees in Industrial/Manufacturing Engineering from North Carolina State University in 2001 and 1997 respectively and his B.S. degree in Industrial Engineering from Istanbul Technical University, Istanbul, Turkey in 1993. He was an Associate Professor (Tenured) of Industrial and Systems Engineering at the University at Buffalo (UB) before joining to Sabancı University in 2010.

Dr. Jose Manuel Cuevas Castell is doctor in Geology at the University of Hamburg (Germany) and degree in Geology at Granada University (Spain). He was head of the Natural Stone Laboratory of AIDICO in Spain from 2007-2015. His main research lines are related to the evaluation and the enhancement of shallow geothermal systems and the characterization and analysis of stone materials and industrial rocks. He has actively participated in several European research project for the enhancement of the efficiency of shallow geothermal systems and GSHP, such as MESSIB, GEOCOND, CHEAP-GSHP, etc. The development of new materials to increase the overall performance of those systems has been his main activity in the last years participating as research fellow in the Technical University of Valencia (SPAIN). Mapping and integration of geological settings in the studies of SGE is also one of the principal research lines trying to integrate the geological information to the design and simulating tools for those shallow energy systems.

Dr. Michael Shuster received his BS degree in Chemical Technology of Organic Compounds (1975) and his MS degree in Technology of Polymer Materials (1978) at Leningrad Chemical-Technological Institute (USSR). Dr. Shuster received his PhD degree in Macromolecular Chemistry, in 1990 at R&D Institute of Chemical Fibers and Composites (Leningrad, USSR) and completed postdoctoral fellowship at the Technion - Israel Institute of Technology (Haifa, Israel) in 1993. Since 1995 he works at R&D Department of Carmel Olefins Ltd. – Israeli petrochemical company - as a researcher, developing new polyolefin-based materials. Dr. Michael Shuster has an expertise in engineering and characterization of polymer materials, his research interests presently include gelation of polyolefin melts, phase change materials for thermal energy storage, toughening of polymers, structural and dynamic heterogeneity of polymers. His publications list includes 30 articles published in international journals, 2 patents and more than 20 conference lectures and presentations.

Ayten Caputcu received BS degree from Geolgical Engineering at Çukurova University, Turkey in 2010. She received MS degree in 2013 at Çukurova University and still PhD student at Mersin University, Turkey. She was a research assistant at Mersin University during 2013-2018. Now she works as a research and development specialist in Çimsa Çimento R&D department for 2 years. Her main subjects are mineralogy of clinker and cement, and microscopy analyses. Also, she is responsible for the using alternative raw materials and fuels in cement manufacturing.