

Recent developments in near room-temperature magnetic refrigeration

November 3rd – 3:00 PM, room 3-442

The magnetocaloric effect (MCE) is the thermal response of a magnetic material subjected to a changing magnetic field. Magnetic refrigeration (MR) harvests the MCE in a regenerative thermodynamic cycle to transfer heat from a low-temperature heat source to a high-temperature heat sink by means of magnetic work. Some advantages of MR in comparison with other cooling technologies are (i) the reversibility of the MCE in some materials, (ii) the recovery of magnetization work with the use of permanent magnets and (iii) the absence of harmful substances (e.g., gases).

This talk will be focused on the development of (i) lab devices and prototypes for near room-temperature MR, (ii) performance evaluation criteria of MR technologies (e.g., efficiency breakdown), and (iii) mathematical models for heat transfer, fluid flow and 2nd law-based optimization of active magnetic regenerators (AMRs).



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Jader Barbosa was awarded a PhD in Chemical Engineering from Imperial College London, UK (2001). His academic interests cover the areas of Fluids Engineering and Thermal Sciences, with an emphasis on Thermodynamics of Mixtures, Phase Change, Multiphase Flows, Enhanced Heat Transfer and Emerging Cooling Technologies. Dr. Barbosa has published more than 220 scientific papers in indexed journals and international peer-reviewed conferences and has advised/co-advised 32 theses/dissertations. He is a member of the Scientific Council of ICHMT and an Officer of the Assembly of World Conferences on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics. He is currently the Fluid Mechanics Technical Editor of the Journal of the Brazilian Society of Mechanical Sciences and Engineering (Springer).

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