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## **SESSION 15: Regenerator / Recuperator Investigations**

**Paper 15.2**

**Thursday ORAL Session**

**11:00 AM**

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### ***Computational Investigation of Idealized Heat Capacity Materials for Packed Sphere Bed Regenerators in Stirling High Frequency 4 Kelvin Cryocoolers Operating in the Real Gas Regime***

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The potential for using Porous Wall Hollow Glass Microspheres (PWHGMS) as a low cost, non-magnetic, readily available regenerator matrix for high frequency Stirling type cryocoolers operating down to 3 Kelvin was explored via modeling. Modeled regenerators using packed beds of various rare earth metals (the current state of the art), PWHGMS, and ideal materials (in terms of heat capacity and conductivity) were compared using industry standard modeling tools SAGEv12 and Regen 3.3, as well as with analytic calculations. This paper presents our findings regarding consistency between the tools, analysis and modeling results, and a discussion of their implications, both for the use for PWHGMS and for future research associated with finite heat capacity solids in real gas regenerators.