BEYOND GLASS MICROSPHERES, HIGH STRENGHT HIGH TEMPERATURE HOLLOW SHELLS

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Key Words: syntactic, hollow-shells, yttrium, mullite, stainless steel

The great potential of syntactic foams often requires material beyond the more commonly available glass and polymer microspheres. Through various partnerships, Deep Springs Technology, (DST) has explored more exotic shell materials from refractory and functional ceramics to stainless steels. This talk will highlight some of these recent developments.

Yttrium silicate and mullite hollow shells are being investigated for use in refractory insulation for hypersonic systems, for their lower thermal expansion and good environmental resistance. Although challenging to fabricate due to the high temperature requirements, hollow shells were produced that met the specification and demonstrated good strength.

Yttrium-iron-garnet is a unique functional ceramic used in microwave, acoustic, optical, and magneto-optical applications. This material was successfully synthesized into hollow three millimeter magnets.

Finally this talk will cover recent stainless steel shell which, like other metal shell produced at DST, poses both high strength and deformability. These properties are particularly useful in light-weighting applications were high toughness and corrosion resistance is require. Preliminarily results on work to failure of the individual shells will be shown.