Foam Shells by Injection Molding

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GENERAL ATOMICS

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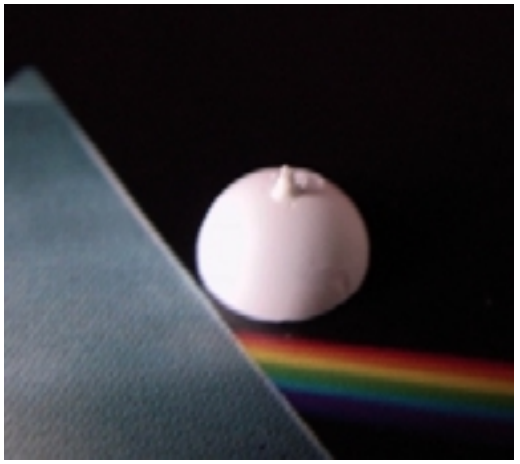
Foam hemishells have been prepared by injection molding

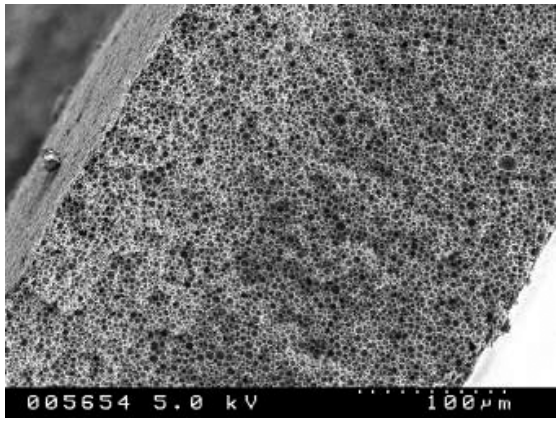


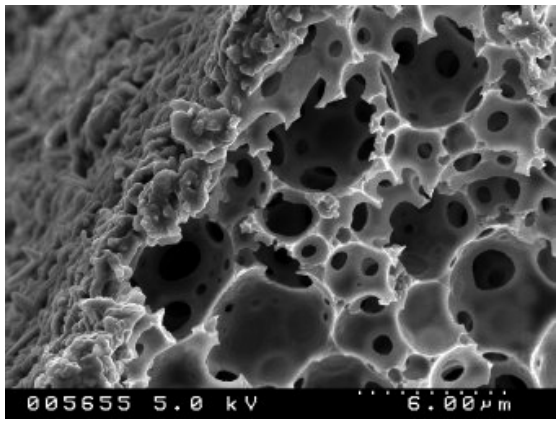
4 mm diameter hemishell - 400µm wall

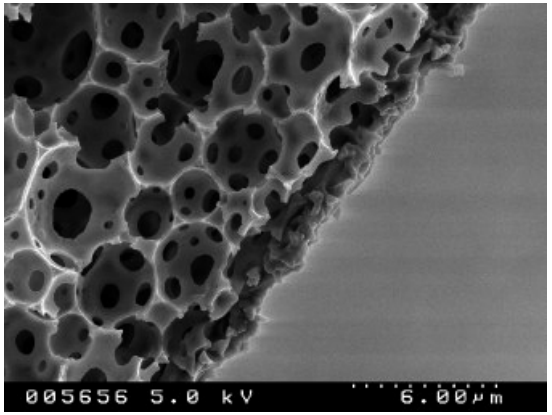
Results

- Teflon mold was fabricated
- 100 mg/cc foam shells were fabricated by a batch process
- Shell can be easily removed from mold
- Defects were seen at the equator & stub remained at the injection port
- We are currently working to resolve these problems

SEMs of injection molded hemishells

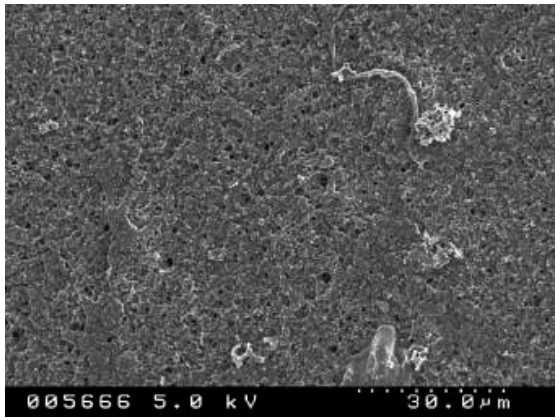


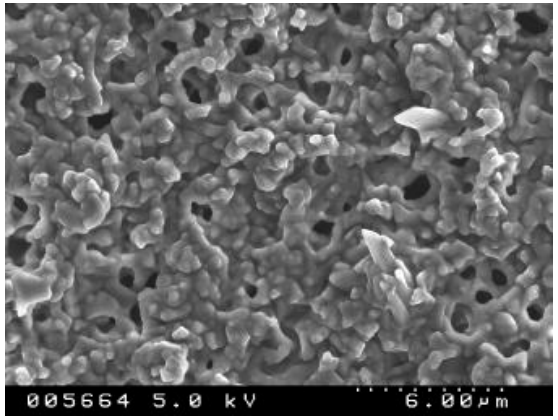




100 mg/cc foam

Teflon mold





GENERAL ATOMICS

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PS foam hemishells have been prepared by injection molding

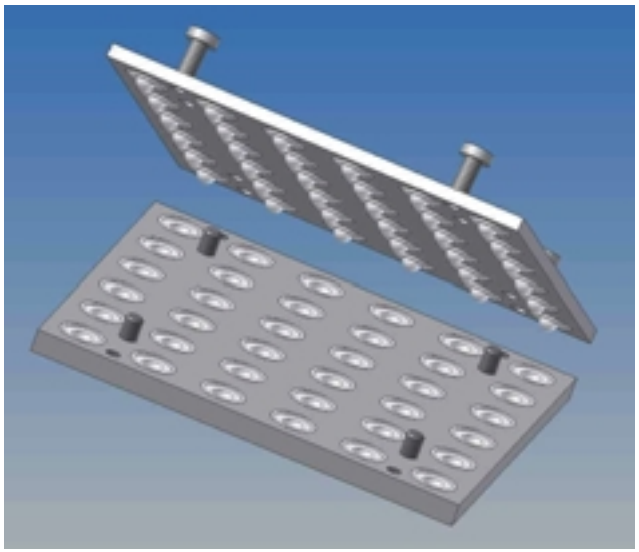
Make hemis in mold
(thousands possible)

↓

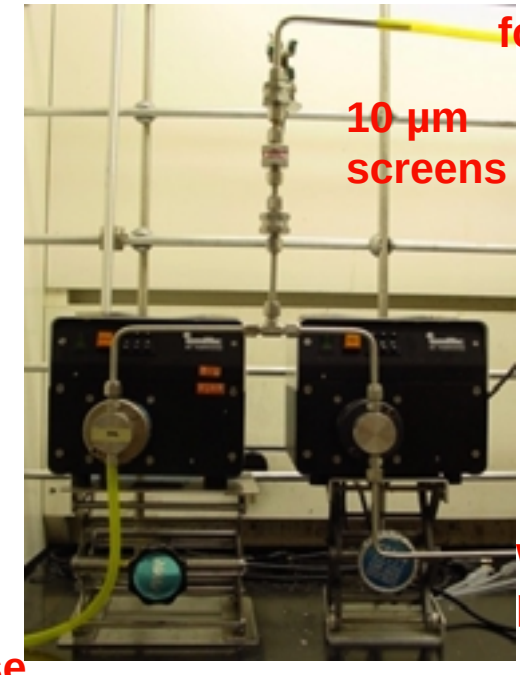
Post processing possible
(remove stub)

↓

Assemble sphere
and overcoat



Continuous process



Advantages

- Simple process
- Reproducible process (each shell will have exactly the same diameter and wall thickness)

Melt processing of hemispheres

- **Advantages**
  - **Green Chemistry**
  - **Eliminates microencapsulation**
  - **Close control of target specifications**

- **Disadvantages**
  - **Closed pores**
    - **Leads to fill problems**

Issues and Future Work

- **Removal of “nub” from injection mold**
  - **Mold with smaller inlet made**
- **Improve mold filling**
  - **Mold design - 12 outlets versus 6 outlets to improve mold filling**
- **Use oversized molds and trim excess**
- **Process affects the skin and surface finish**
  - **Depends on mold material**
- **Scale up to mltiple hemishells**

Conclusions

- We have been able to fabricate hemishells by injection molding
- The surface finish depends on the molds surface
- Metering pumps make it possible to make foams in a continuous process
- Melt extrusion not amenable for direct drive targets