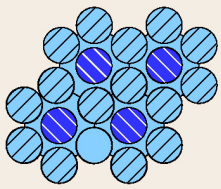
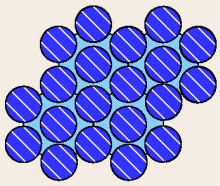
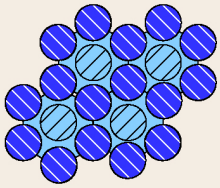
Glass Capacitor for High-Temperature Applications

UT-B ID 200701889

Capacitor Schematic

Electrode	Electrode	Electrode
Top Cap Cross Section	Midsection Cross Section	Bottom Cap Cross Section
		

Technology Summary

To meet the demand for smaller, lighter capacitors that have high energy densities, an ORNL researcher developed a capacitor made of glass rods that is constructed like insulated wire. This device can be used for power factor correction, high-voltage capacitors, power electronic filters, energy storage, and components in electric and hybrid-electric vehicles.

The glass rods of the capacitor are bundled together, and the bundle is heated until it can be drawn out into a smaller-diameter version of itself. With this method, both the conductors and insulation become thinner but retain their spatial relationship to each other. The drawn rod is cut into pieces, which are themselves bundled together, heated, drawn, and so on until the required dimensions are obtained. In the finished bundle, the thickness of the conductors and the insulation can range from 0.1 to 100 µm. Capacitance increases with each reduction in size (a 10× reduction would yield a 1000× increase in capacitance).

Advantages

- Superior reliability in extreme environments
- High operating temperature
- High operating voltage
- Low dielectric absorption
- Zero piezoelectric noise
- Self-healing
- Scalable production

Potential Applications

- Energy storage
- Power factor correction
- High-voltage capacitors
- Power electronic filters

Patent

Enis Tuncer, Well Defined Structures for *Capacitor Applications,* U.S. Patent Application 12/351,121, filed January 9, 2009.

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