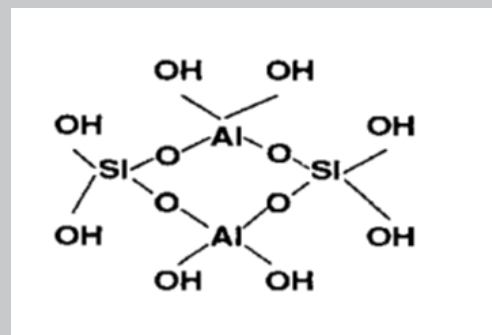
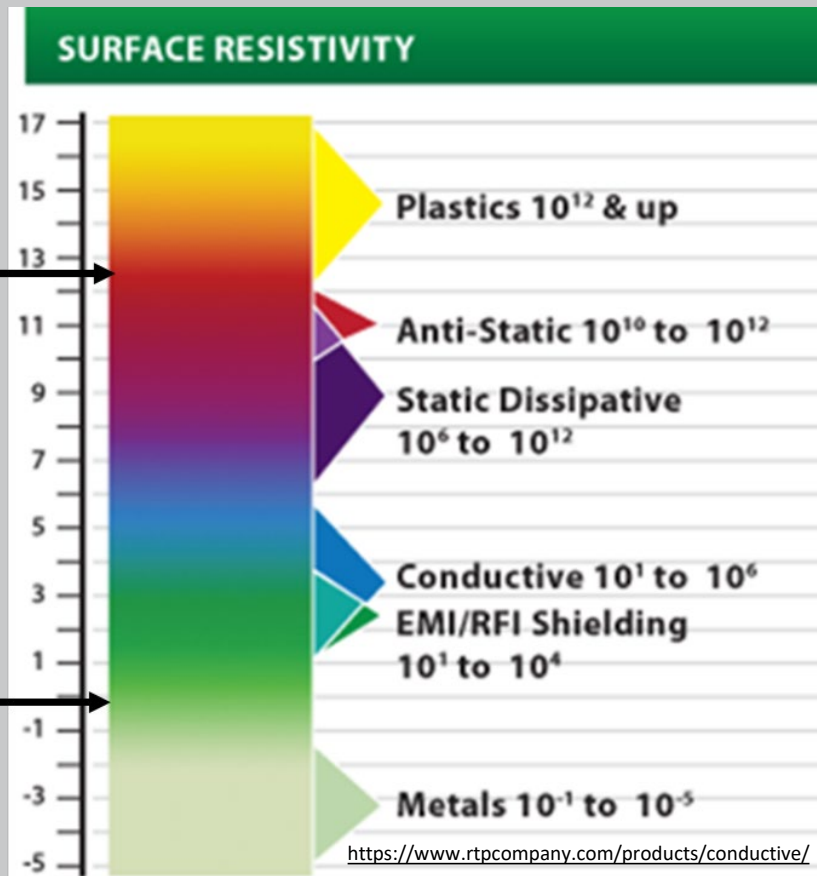


Multifunctional Geopolymer Materials

Introduction:

Geopolymers are inorganic polymers that are semi-amorphous, three-dimensional networks of polymeric sodium-, potassium-, calcium- SIALATES (silico-oxo-aluminate)



Sodium poly(sialate)



Fire-Resistant Geopolymer¹

Geopolymer Properties:

- Low-cost
- Ceramic-like properties
- Fire resistant
- Wear resistant
- Chemically resistant
- Tailorable density
- Tailorable CTE
- Tailorable Resistivity
- Tailorable Thermal Conductivity

Geopolymer Processing:

- Low-cost
- Inexpensive starting materials
- Low-temperature processes
- Straight-forward robust processes
- Water-soluble inorganic polymer
- Can be spray, cast, rolled, printed, or filament wound

1. Davidovits, Joseph. "years of successes and failures in geopolymer applications. Market trends and potential breakthroughs." In Geopolymer 2002 Conference.

Geopolymer Properties and Applications

Geopolymer Thermal Properties:

Sample	Specific Heat (J/(g °C))	Thermal Conductivity (W/(m K))	CTE (ppm/°C)	Source
Baseline	1.09	0.96	NM	HiFunda
Baseline + 2% Additive E	1.25	0.66	NM	HiFunda
Baseline + 3% Additive E	1.24	0.71	12.2	HiFunda
Baseline + 5% Additive E	1.24	0.65	NM	HiFunda
96% Al ₂ O ₃	0.88	24.7	8.2	Matweb
A513, Grade 1010 Steel	0.45	49.8	12.2	Matweb
Nylon6	1.65	0.23 to 1.5	170	Matweb
Epoxy Resin	0.30	0.185	35 to 543	Matweb
Glass Wool	0.84	0.040		The engineering toolbox

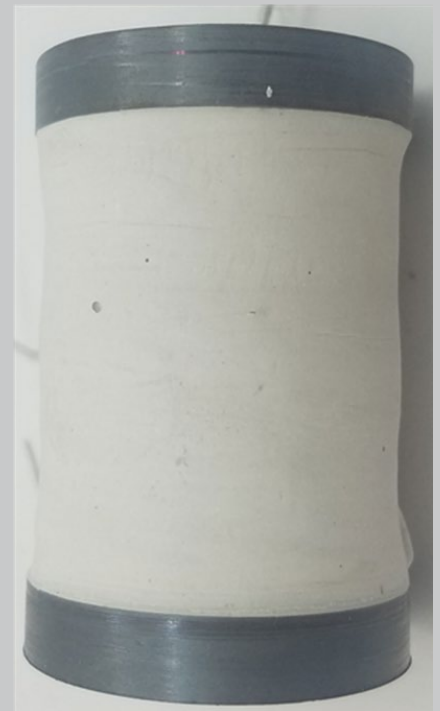
Applications Demonstrated by HiFunda:



Wear-Resistant,
Conductive
Geopolymers on
Plastics



Filament Winding of
Low-cost, Heat-resistant
Composites for Large-
Caliber Armament
Applications



Castable Potting
Compound for
High-Temperature
Electromagnets