Conductive Polymer Additive Study

Asbury Graphite Mills specializes in conductive additives to aid in improving conductivity as polymers and plastics are inherently low in thermal and electrical conductivity. Many carbons, especially graphite, have conductive values orders of magnitude higher than polymers or plastics. With the correct dispersion and loading levels, graphite and carbon can be used to convert an insulating polymer system into a conductive composite. The key to creating the highest level of conductivity is creating a conductive pathway through the article with interconnected particles. Asbury has performed in depth research and experimentation seeking the best particle(s) to add to a polymer system in order to achieve the thermal and electrical conductivity required.

System	Grade	Additive Loading %	Composite Loading %	Resistivity ohm/cm	In-Plane TC W/mK	Through-Plane TC W/mK
Control	LDPE	100	100%	4.7×10^{15}	0.5	0.6
1	4439FM (Synthetic)	95	30%	1.8×10^{8}	1.3	0.9
			35%	4.2×10^{6}	1.5	1.0
	4827 (GNP)	5	40%	1.1×10^{6}	1.7	1.1
			45%	2.5×10^{5}	2.3	1.2
2	230U (Flake)	90	30%	7.4×19^{8}	1.1	0.9
			35%	2.6×10^{6}	1.9	0.9
	3062 (GNP)	10	40%	7.0×10^{5}	2.4	0.9
			45%	3.1×10^{5}	3.0	1.2
3	3806 (SEFG)	100	30%	1.1×10^{5}	1.9	1.3
			35%	8.9×10^{4}	1.8	1.3
			40%	3.9×10^{4}	2.3	1.3
			45%	3.1×10^{4}	4.5	1.7

Conclusions:

- Asbury's Surface Enhanced Flake Graphite(SEFG) exhibits the highest level of performance in both thermal and electrical conductivity at the loading levels tested
- In LDPE, at 30% loading, all of the materials achieve the percolation threshold.
- Asbury's Graphite Nanoplatelet Powders (GNP) can help increase the net conductive effect when added to polymer systems by bridging between larger primary conductive fillers.

ASBURY CARBONS
An ISO 9001 Corporation

ASBURY GRAPHITE MILLS, INC.
405 Old Main Street • PO Box 144 • Asbury, New Jersey 08802
Phone: 908.537.2155 • Fax: 908.537.2908
www.asbury.com

03/18