

Polymer-Polymer Fiber Composite for High Thermal Conductivity

A method to make thermally conductive polymer resin suitable for electronics applications

Georgia Tech inventors have developed a method for making thermally conductive polymer resin. In this tunable process, thermoplastic polymers/elastomers, polymer fiber, binding agents, and thermally conductive fillers are combined to create a hybrid conductive particle. This method results in a resin that has higher thermal conductivity than those formed using traditional injection molding techniques. In addition to achieving higher thermal conductivity, the thermally conductive polymer resin will create a composite material that has higher tensile strength, and higher impact toughness. The electric properties of the resin are also tunable, based on the components used in mixing, allowing for either electrically insulating or conducting resin particles.

Summary Bullets

- **Better mechanical properties** – Process creates polymeric resin that is stronger and tougher than current methods
- **Easier to process** – Polymers are easier to make and process than metal materials
- **Tunable electrical capabilities** – Can be made as conducting or insulating

Solution Advantages

- **Better mechanical properties** – Process creates polymeric resin that is stronger and tougher than current methods
- **Easier to process** – Polymers are easier to make and process than metal materials
- **Tunable electrical capabilities** – Can be made as conducting or insulating
- **Electrical Shielding** – Conducting particle can provide shielding from electromagnetic interference (EMI) and radio frequency interference (RFI)

Potential Commercial Applications

- Injection Molding
- 3D Printing thermally conductive parts
- Electronic thermal management

Background and More Information

As electronic devices continue to shrink; their power density continues to rise, making the removal of heat a growing challenge. While plastics are cheaper to manufacture than metals because of ease of processing, their use is often limited due to poor thermal conduction. Many commercial suppliers make polymer composite materials filled with thermally conductive particle to create plastic parts that can conduct heat and replace metals. These polymer composites, however, often exhibit degradation of properties, such as increased brittleness, increased electrical conductivity, and poor surface finish. Thus, there is a need for a polymeric composite material that achieves appropriate thermal conductivity while maintaining physical properties.

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IP Status

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Publications

[GEEKOUT: Heating Up the Energy Sector with Baratunde Cola](https://youtu.be/OB393JkKu-g), GEEKOUT: Heating Up the Energy Sector with Baratunde Cola - <https://youtu.be/OB393JkKu-g>

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