Conducting Polymers for Aerospace Applications

Pi-conjugated electroactive and conducting polymers provide a range of properties potentially applicable to the aerospace industry. With conductivities ranging from 1 to 1,000 S/cm, they are applicable to a range of EMI shielding applications. Material forms are accessible as powders for direct blending into composites, films which can be laid up in multi-layer prepregs prior to curing, and as conductive coatings on glass and polymer textiles. Especially highly conductive compositions can be considered for use in lightning strike protection. Solution processable compositions can be patterned and printed with potential utility in light-weight flexible electronics.

The ability to electrically switch these polymers between redox states, in essence charged and neutral forms, provides a means for controllable conductivities and optical properties. Electrochromism (EC), changes in the absorption of electromagnetic radiation with electric field, shows these materials to be active from the UV, through the visible and infrared, and even into the microwave region of the spectrum. Visible light can be used to provide color changing windows and surfaces, while IR EC provides a means for signature control.

https://ww2.chemistry.gatech.edu/reynolds/