



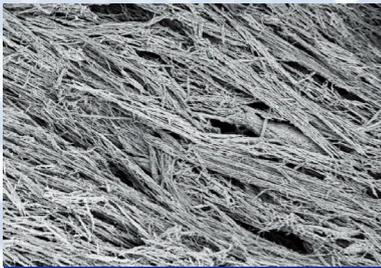
Novel Magnetic Materials

Magnetic Nanowires

Electromagnetic Shielding Materials for Millimeter and Sub-millimeter Waves

High-performance electromagnetic shielding was achieved with the magnetic nanowires developed by UNITIKA. This technology prevents malfunction and performance degradation of the devices such as antenna and radar, which are the key components of Beyond 5G (6G) Communications and autonomous vehicles.

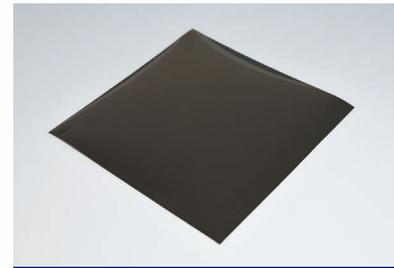
- ▶ **Excellent electromagnetic shielding effect for millimeter and sub-millimeter waves derived from a combination of dielectric loss and magnetic loss.**
- ▶ **Superior magnetic properties to conventional magnetic materials due to their high aspect ratio.**
- ▶ **Compatible with a wide range of materials including thermoplastic and thermoset.**



SEM image of the magnetic nanowire



Ink containing the magnetic nanowire

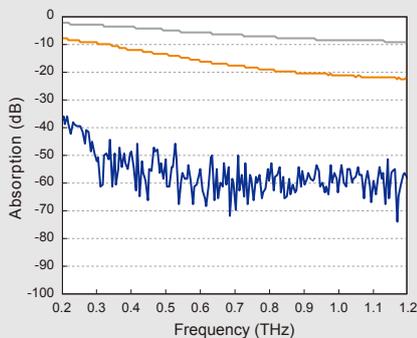


Sheet filled with the magnetic nanowire

Technical data

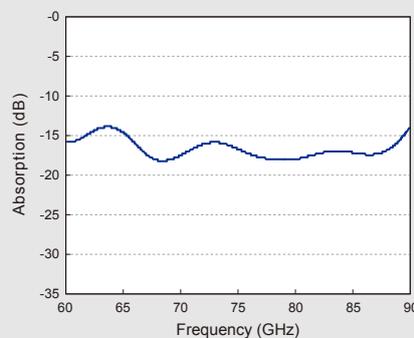
Electromagnetic wave absorption properties

At sub-millimeter band



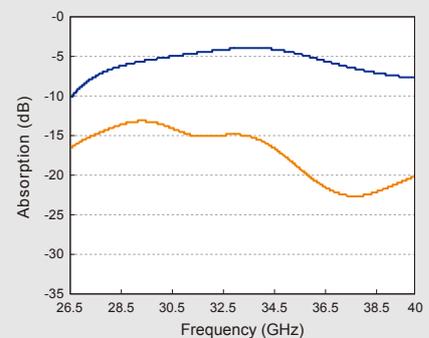
— FeNi₄ Nanowire + Silicone rubber (Nanowire loading:0.1vol%)
 — FeNi₄ Nanowire + Silicone rubber (Nanowire loading:4.5vol%)
 — Silicone rubber
 Thickness:400μm
 Measured by THz-TDS

At millimeter band



— FeNi₄ Nanowire + Silicone rubber (Nanowire loading:4.5vol%)
 Thickness:100μm
 Measured by Free-space method

At millimeter band



— FeNi₄ Nanowire + Silicone rubber (Nanowire loading:4.5vol%)
 — FeNi₄ Nanowire + Silicone rubber (Nanowire loading:10vol%)
 Thickness:100μm
 Measured by Free-space method

(Notice) This product is under development. The information in this document is presented without guarantee and warranty.