

Supplementary materials

High Performance Thermal Interface Materials with Magnetic Aligned Carbon Fibers

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Theoretical calculation of the alignment time of CF in matrix

Kimura model

$$t = -\frac{6\mu_0\eta}{F(D)\chi_a B^2} \ln\left(\frac{\tan\theta}{\tan\theta_0}\right)$$

with

$$F(D) = \frac{3D\left(-2D\sqrt{D^2-1} + (1-2D^2)\ln\frac{D-\sqrt{D^2-1}}{D+\sqrt{D^2-1}}\right)}{4(D^2-1)(D^2+1)\sqrt{D^2-1}}$$

Where D is the aspect ratio, μ_0 is the magnetic permeability of vacuum ($4\pi\times10^{-7}\text{T}\cdot\text{m/A}$), η is the viscosity of the matrix, χ_a is the volume anisotropic diamagnetic susceptibility, B is the magnetic flux density, θ and θ_0 are the initial angle and final angle between B and the fiber axis respectively, t is the alignment time. In this work, these parameters are input as follows: $D = 15$, $\eta = 1/10/100\text{Pa}\cdot\text{s}$, $\chi_a = 4.0\times10^{-6}$, $B = 0/1/3/5/7/9\text{T}$, $\theta = 1^\circ$, $\theta_0 = 90^\circ$.

The detailed size of the test system

Table S1. The detailed size of the test system

Component	Number	Size (mm)
Ceramic heating plate	1	30×30×2
Upper aluminium plate	1	45×45×2 (baseplate)

		15×15×3 (lug boss)
Lower aluminium plate	1	60×60×7
CF-rubber composite	1	15×15×1
Polyimide screws	4	Φ3