Theoretical calculation of thermal conductivity in bridging particle connected system

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Recently, the composite for heat dissipation has become important as electronic devices have become highly integrated. In the previous studies, the composite for heat dissipation was typically made of polymer and solid powders such as metal, ceramic to achieve high thermal conductivity (k) and excellent processibility. However, k of composite were relatively lower than the solid powder because of low k of polymer.
Here, we calculate k of the composite when the bridging particles which have high thermal conductivity are located between the solid powders. In this case, this bridging powders make a direct heat path between the powders and heat could be dissipated from the composites easily through the direct heat path. Moreover, this could result in dramatic increase of k in comsposite.
In this research, we predict k of composite as a function of volume percent of bridging particles / the solid powders. In addition, we compare k of bridging particle connected system with that of particle dispersed system.