Fundamentals of Micro/Nanoscale Silver Sintering Materials for High-Power Applications From Experiments to Multi-Scale Simulation

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Propositions

accompanying the dissertation

FUNDAMENTALS OF MICRO/NANOSCALE SILVER SINTERING MATERIALS FOR HIGH-POWER APPLICATIONS

FROM EXPERIMENTS TO MULTI-SCALE SIMULATION

by

Xiao HU

1. For spherical silver nanoparticles smaller than 100 nm, the surface diffusivity exhibits a stronger dependence on temperature than on size. *(this dissertation)*
2. Near the thermal percolation threshold, effective thermal conductivity increases sharply, allowing to identify the critical silver volume fraction for performance optimization. *(this dissertation)*
3. During high-temperature air aging, pore-grain coevolution and the oxide-induced pinning effect trigger recrystallization and hardening in sintered silver layers. *(this dissertation)*
4. Hybrid Potts-Phase Field model simultaneously simulates pore migration and grain growth but must account for stochasticity of Potts model and stability constraints of explicit schemes. *(this dissertation)*
5. No single governing equation can control the behavior of the entire universe.
6. Education is less about transferring knowledge, more about building a creative personality.
7. Qualified PhD researchers create insights and knowledge that cannot be found via Google search.
8. Without framing the right problem, there will be no right solution.
9. A satisfactory life builds upon accepting own limitations.
10. During PhD studies, keeping a pet enhances productivity in both work and life.

These propositions are regarded as opposable and defendable and have been approved by the promotor Prof. dr. G.Q. Zhang and the co-promotor Dr. ir. R.H. Poelma.