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Hotspot Cooling with Self-Propelled Jumping Condensate XIAOPENG QU, JONATHAN B. BOREYKO, FANGJIE LIU, CHUAN-HUA CHEN[1], Department of Mechanical Engineering and Materials Science, Duke University, Durham, NC 27708 — Dynamic hotspots are prevalent in electronic systems including microprocessors and power electronics with constantly changing computing tasks or payloads. Here, we report a new adaptive hotspot cooling technique that rapidly responds to moving hotspots in a passive manner independent of external forces. The hotspot cooling is based upon the self-propelled jumping of dropwise condensate, which directly returns the working fluid from a superhydrophobic condenser to an opposing superhydrophilic evaporator. The adaptive thermal management is accomplished by the preferential evaporation of water at the hotspots and the rapid jumping return of the condensate across the very short inter-plate distance. The proof-of-concept for this hotspot cooling technique will be demonstrated by the adaptive response to hotspots at increasing heat fluxes.

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