

Direct Assembly of Micro LEDs and their Thermal Management

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As flexible and deformable electronics dramatically advance, their components should be fabricated for miniaturized scale, and integrated on limited-size substrates with extremely high density. Current technologies for 1) the integration and interconnection of electronics as well as 2) preventing thermal degradation in deformable electronics show some critical limitations in the application of microscale electronics. Here, a new direct and vertical interconnection driven by selective dewetting of a polymer adhesive is introduced for question #1. Presented here for question #2, moreover, is an effective assembly technique to realize a continuous array of boron nitride (BN) nanosheets on tetrahedral structures, creating 3D thermal paths for anisotropic dissipation integrated with deformable micro LEDs. Also, various electronic device demonstrations provide exceptional heat dissipation capabilities, including thin film silicon transistor on flexible and stretchable composite, respectively.

Ref #1, Adv. Mater. 31, 1908422 (2020)

Ref #2, Adv. Funct. Mater 29, 1902575 (2019)