Semiconductor Nanomaterials in 3D and Transient Electronics

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A remarkable feature of modern integrated circuit technology is its ability to operate in a stable fashion, with almost perfect reliability, without physical or chemical change. Recently developed classes of electronic materials create an opportunity to engineer the opposite outcome, in the form of 'transient' devices that dissolve, disintegrate or otherwise disappear at triggered times or with controlled rates[1]. Water-soluble transient electronics serve as the foundations for applications in zero-impact environmental monitors, 'green' consumer electronic gadgetry and bio-resorbable biomedical implants. This presentation describes the essential concepts in chemistry, materials science and assembly processes for bioresorbable electronics in 1D, 2D and 3D architectures, the latter enabled by approaches that draw inspiration from the ancient arts of kirigami and origami. A focus will include our latest work in this area, ranging from 3D microflier structures for environmental monitoring[2,3] to the world's smallest pacemakers for temporary use after a cardiac surgery[4].

Reference

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- 3. B.H. Kim et al, *Nature* 597, 503 (2021).
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