ABSTRACT
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. Water-soluble transient electronics serve as the foundations for interesting applications in zero-impact environmental monitors, ‘green’ consumer electronics and bioreparable biomedical implants. This presentation describes the foundational concepts in chemistry, materials science and assembly processes for bioreparable electronics in 1D, 2D and 3D architectures, the latter enabled by approaches that draw inspiration from the ancient arts of kirigami and origami. Wireless sensors of intracranial temperature, pressure and electrophysiology designed for use in treatment of traumatic brain injury and nerve stimulators configured for accelerated neuro-regeneration provide application examples.

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