

‘Almost no limit’: Synthetic biology has turned the stuff of science fiction into the stuff of science

[Synthetic biology](#), or the application of engineering principles to the design of life, presents world-changing prospects. Could components of a living cell function as tiny switches or circuits? How would that allow biomedical engineers to build biological “smart devices”—from sensors deployed inside the body to portable medical kits able to produce vaccines and antibiotics on demand? Could bacterial “factories” replace the fossil-fueled industries that produce [plastics, foods, and fertilizers](#)? Will the secrets of living creatures that enter suspended animation during periods of drought and extreme cold be harnessed to keep human victims of trauma alive? And is the genetic information preserved in long-frozen or fossilized extinct species, like woolly mammoths, sufficiently recoverable to help save living species?

These ideas, once the stuff of science fiction, are now the stuff of science. Some aren’t yet functioning realities, but others have launched business applications, whether in medicine (such as hospital gowns that signal exposure to infection) or in land remediation (where bacterial “factories” powered by the sun capture nitrogen from the atmosphere to help plants grow).

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“I think there’s almost no limit to synthetic biology,” [geneticist George] Church says.

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