TECHNIQUES THAT produce holograms have helped researchers create little lithium-ion batteries that could power microelectronic devices, such as sensors, medical implants, and radio frequency transmitters.

As engineers continue to shrink the size of electronics, they stoke a growing demand for miniaturized power supplies. Although researchers have already created millimeter-sized microbatteries, these generally fail to store sufficient energy or produce enough power for devices.

Engineers at the University of Illinois, Urbana-Champaign, recently demonstrated that porous, three-dimensional electrodes can boost a lithium-ion microbattery’s power output by three orders of magnitude. But the team, led by Paul V. Braun, lacked a simple, reliable way to optimize their electrode structure. Braun’s team has now used holograms, which are the 3-D interference patterns of multiple laser beams, to precisely create porous blocks in light-curable polymers (Proc. Natl. Acad. Sci. USA 2015, DOI: 10.1073/pnas.1423889112). They then used these blocks as scaffolding to build electrodes.

The hologram process is compatible with conventional 2-D photolithography, a stalwart of the microelectronics industry, Braun says. The team electroplated the resulting polymer structures with nickel and then dissolved the polymer, leaving porous metal electrodes. The researchers then coated their cathodes with lithiated manganese oxide and their anodes with a nickel-tin alloy. After adding a drop of electrolyte, they sealed the device using elastomer and resin.

These finishing steps can add cost and bulk to a microbattery, which is not ideal, notes Daniel Brandell of the Ångström Advanced Battery Centre at the University of Uppsala, in Sweden, who was not involved in the study. “Nevertheless,” he says, “the work demonstrates that high power density can be achieved for 3-D microbatteries, which is one of the ultimate goals of this field.” But the team believes the takeaway from its study should be the holographic electrode design, rather than the batteries themselves, says Hailong Ning, a lead researcher in Braun’s group. The patterning technique puts few restrictions on the electrode materials used in the battery, he says. “There are other chemistries to explore.”

— MATT DAVENPORT

PHARMACEUTICALS GlaxoSmithKline, University of North Carolina to seek HIV cure

In the latest twist on industry-academic collaboration, GlaxoSmithKline and the University of North Carolina, Chapel Hill, have teamed up with the ambitious goal of finding a cure for HIV. Together they will establish the HIV Cure center, a research facility on the UNC campus, and launch Qura Therapeutics, a jointly owned firm that will house any intellectual property they generate.

GSK is committing $20 million in research support over five years. Ten of its scientists will work at the Cure center. Some 40 UNC researchers, including ones from the labs of HIV expert David Margolis, will also be there.

The unusual setup was three years in the making, according to Zhi Hong, head of GSK’s infectious diseases therapy unit. He expects the partners to spend five to 10 years conducting basic research before turning to drug development.

GSK is already involved in HIV drugs through ViVi Healthcare, a joint venture with Pfizer and Shionogi. ViVi has a portfolio of drugs that work by suppressing viral replication. Although antivirals have mostly turned HIV into a disease that people live with, rather than die from, they aren’t a cure. The new venture hopes to completely eliminate the reservoir of viral DNA that hides out in cells.

GSK is not alone in forging closer ties with academia. Pfizer, for example, has established a network of labs in which its scientists work alongside university researchers to translate basic science into medicines.

Such ties are being established as big pharma companies cut back on their internal research. Earlier this year, GSK announced major job reductions at its R&D site in Research Triangle Park, N.C.—LISA JARVIS