read-back amplitudes depend strongly on the write phase, vanishing for writing out-of-phase on the single-domain islands as a result of the fact that bit transitions (domain walls) cannot be placed in the islands, and thus each island would have a 0.5 probability of being magnetized either up or down. The researchers also found evidence that for in-phase writing, there is a reduction of the read-back signal compared with the unpatterned media of identical linear density, which was linked to the reduction of magnetic material associated with patterning, although even the very smallest islands clearly exhibit a periodic signal. The work is still in its beginning stages, and it will continue focusing on improving the stability of the patterned island arrays.

CLAUDIU MUNTELE

Electrical Microdischarge Channel Integrated with Si p–n Diode Allows Efficient Generation of Visible/Near-IR Light

Efforts to generate visible or near-infrared radiation from silicon have a long history, but have been only moderately successful. External quantum efficiencies as high as ~1% are the most that could be obtained after extensive research. A research team from the Department of Electrical and Computer Engineering at the University of Illinois has taken a different approach to overcome the problem, integrating a reverse-biased silicon *p–n* junction with an electrical gas-discharge microchannel as reported in the February 5 issue of *Applied Physics Letters*. The gas discharge driven by a *p–n* junction offers the possibility of fabricating large arrays, and can be directly integrated with electronic and opto-electronic devices.

In designing these devices, C.J. Wagner, S.-J. Park, and J.G. Eden used commercially available diodes with the casings removed. After depositing a poly(methyl methacrylate) (PMMA) film around the perimeter of the exposed area for breakdown prevention, they drilled by ultrasonic milling a cylindrical channel through the ohmic contact and the *p–n* junction. The devices were then filled with the desired pressure of research-grade gas. For a Ne gas pressure of 700 Torr, the wavelength-integrated (300-800-nm) output power was ~48 μW for an operating current of 5.7 mA and a bias voltage of 134 V. Unlike previous hollow and planar cathode microdischarge devices fabricated in Si, no dielectric layer is required with this approach. The simplicity and robust structure of these hybrid semiconductor/gas-discharge devices as well as their suitability for manufacture by conventional photolithographic and laser micromachining techniques make them attractive for arrays and on-chip atomic-frequency standards.

CLAUDIU MUNTELE

Single-Electron Inverter Achieves Voltage Gain of 2.6 at 25 mK

Theoretically, single-electron tunneling devices could be used for computation because they can be made very small and would consume little power. However, few actual logic elements have been built and tested. C.P. Heij, P. Hadley, and J.E. Mooij from Delft University of Technology, The Netherlands, recently fabricated and experimentally tested a single-electron inverter.

As reported in the February 19 issue of *Applied Physics Letters*, the inverter consists of two identical single-electron transistors (SETs) in series, sharing a common input gate, bearing a strong resemblance to a standard complementary metal-oxide semiconductor (CMOS) inverter. Each SET contains a small aluminum island,

https://doi.org/10.1557/mrs2001.28 Published online by Cambridge University Press