Information storage for the next generation of plastic computers

April 16 2014, by Gary Galluzzo

Inexpensive computers, cell phones and other systems that substitute flexible plastic for silicon chips may be one step closer to reality, thanks to research published on April 16 in the journal *Nature Communications*.

The paper describes a new proposal by University of Iowa researchers and their colleagues at New York University for overcoming a major obstacle to the development of such plastic devices—the large amount of energy required to read stored information.

Although it is relatively cheap and easy to encode information in light for fiber optic transmission, storing information is most efficiently done using magnetism, which ensures information will survive for years without any additional power.

"So a critical issue is how to convert information from one type to another," says Michael Flatté, professor of physics and astronomy in the College of Liberal Arts and Sciences (CLAS) and director of the UI Optical Science and Technology Center.

"Although it does not cost a lot of energy to convert one to the other in ordinary, silicon-chip-based computers, the energy cost is very high for flexible, plastic computing devices that are hoped to be used for inexpensive "throwaway" information processors.

"Here we show an efficient means of converting information encoded in magnetic storage to light in a flexible plastic device," says Flatté, who

also serves as professor in the UI College of Engineering's Department of Electrical and Computer Engineering.

What Flatté and his colleagues did was to successfully accomplish information transduction (or transfer and conversion) between a magnet and an organic light-emitting diode at room temperature and without electrical current flow between the magnet and the organic device.

"The magnetic fields from the magnetic storage device directly modify the light emission from the device. This could help solve problems of storage and communication for new types of inexpensive, low-power computers based on conducting plastics," says professor Markus Wohlgenannt, also of the Department of Physics and Astronomy and the Optical Science and Technology Center.

Professor Andrew Kent of New York University notes that while these studies were conducted on relatively large devices, miniaturized devices would operate on the same principles and enable new types of high capacity storage technologies.

More information: "Organic Magnetoelectroluminescence for Room Temperature Transduction between Magnetic and Optical Information" *Nature Communications*, 2014.

Provided by University of Iowa