Until now, any computer calculation is hampered by the basic computer architecture: All data has to be shifted back and forth between fast but volatile random access memory (RAM) and the non-volatile but slow hard drive. The ultimate data memory combines non-volatile behaviour together with fast read and write access and a high integration density. Great potential lies in resistively switching memory cells, which consist of a conductor-insulator-conductor structure. By applying appropriate voltages, the cell resistance can be switched between at least two resistance states, corresponding to “0” and “1”. The non-volatile resistive memory offers fast operation speed and low power consumption. We report inkjet printing of resistive memory cells, which provides two additional advantages: Firstly, the printing at ambient conditions makes cleanroom environment obsolete and considerably lowers the production costs. Secondly, printing on flexible films opens the door to the up-and-coming field of printed electronics, where resistive memory could be integrated in flexible printed circuits. We use a standard FujiDimatix® 2831 inkjet printer for the printing of all 3 layers of our memory cells. For the conducting electrodes we use organic polymers and various commercial as well as in-house synthesized metal nanoparticle inks. The insulator layer consists of a printed methylsiloxane polymer. As a substrate we use rigid silicon wafers and flexible polyimide films. The cells show the potential for multi-bit data storage. With switching voltages below 3 V and switching currents in the nanoampere regime, we already see a substantially lower power consumption compared to flash technology.

Biography
B Huber holds BSc and MSc degrees in Physics from the Technical University of Munich. Since fall 2015, he has been working toward the PhD degree at the Munich University of Applied Sciences in collaboration with the Institut National de la Recherche Scientifique (INRS) in Montréal. His research interests are in fabrication and characterization of inkjet printed electrochemical memory using various materials.

bernhard.huber@hm.edu