Chips of Hope: Neuro-Electronic Hybrids for Brain Repair

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The field of Neuro-Electronic Hybrids kicked off 30 years ago when researchers in the US first tweaked the technology of recording and stimulation of networks of live neurons grown in a Petri dish and interfaced with a computer via an array of electrodes. Since then, many researchers have searched for ways to imprint in neural networks new "memories" without erasing old ones. I will describe our new generation of Neuro-Electronic Hybrids and how we succeeded to turn them into the first learning Neurochips - memory and information processing chips made of live neurons. To imprint multiple memories in our new chip we used chemical stimulation at specific locations that were selected by analyzing the networks activity in real time according to our new information encoding principle. Currently we develop new-generation of neuro chips using special carbon nano tubes (CNT). These electrodes enable to engineer the networks topology and efficient electrical interfacing with the neurons. This advance bears the promise to pave the way for building a new experimental platform for testing new drugs and developing new methods for neural networks repair and regeneration. Looking into the future, the development brings us a step closer towards the dream of Brain Repair by implementable Neuro-Electronic hybrid chips.