INV6

Organic Neuromorphic Electronics and Adaptive Biosensing

Yoeri van de Burgt
[1] *Microsystems, Eindhoven University of Technology, Eindhoven, Netherlands*
[2] *Institute for Complex Molecular Systems, Eindhoven University of Technology, Eindhoven, Netherlands*
Author e-mail address: y.b.v.d.burgt@tue.nl

Neuromorphic computing could address the inherent limitations of conventional silicon technology in dedicated machine learning applications. Recent work on large crossbar arrays of two-terminal memristive devices has led to the development of promising neuromorphic systems. However, delivering a compact and efficient parallel computing technology that is capable of embedding artificial neural networks in hardware remains a significant challenge.

Organic electronic materials have shown potential to overcome some of these limitations. This talk describes state-of-the-art organic neuromorphic devices and provides an overview of the current challenges in the field and attempts to address them. I demonstrate a concept based on novel organic mixed-ionic electronic materials and show how we can use these devices in trainable biosensors and smart autonomous robotics.

Next to that, organic electronic materials have the potential to operate at the interface with biology. This can pave the way for novel architectures with bio-inspired features, offering promising solutions for the local manipulation and the processing of biological signals and potential applications ranging from brain-computer-interfaces and smart robotics to bioinformatics. I will highlight our recent efforts on adaptive sensing and hybrid biological memory devices.