Neuromorphic materials designed atom by atom (neurAM)

Initiative: NEXT

Ausschreibung: Neuromorphic Computing

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Machine learning algorithms are readily employed, for example in pattern recognition. These algorithms draw inspiration from the brain. However, compared to computers, the brain can perform many cognitive tasks with a much higher efficiency. Consequently, computer architectures that emulate the function of synapses and neurons in the brain are a promising basis for more efficient and greener electronic devices. Yet, today's machine learning algorithms still rely on conventional computing hardware. Neuromorphic hardware that is designed for specific machine learning applications promises a new paradigm in computing, more similar to the brain, in which software and hardware are no longer distinguishable. The goal of this project is to create materials with inherent properties resembling the neuronal structure of the brain: namely materials with plasticity that are self-adaptive. To find such materials, the researchers study the interactions between atoms in two-dimensional arrays. They search for configurations of interacting atoms that can be used to perform specific computational tasks, i.e. recognize patterns in input stimuli, perform logical tasks and have memory. The investigation of these materials and the interaction with them is performed using scanning tunneling microscopy.

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