NEUROVSKITE: Lead-Free Halide Perovskite Memristors for Energy-Efficient Neuromorphic Computing

MSCA Staff Exchanges 2026 with CSIR-EU Co-funding

Lead Institution:
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EU Partner:
AGH University of Kraków, Poland

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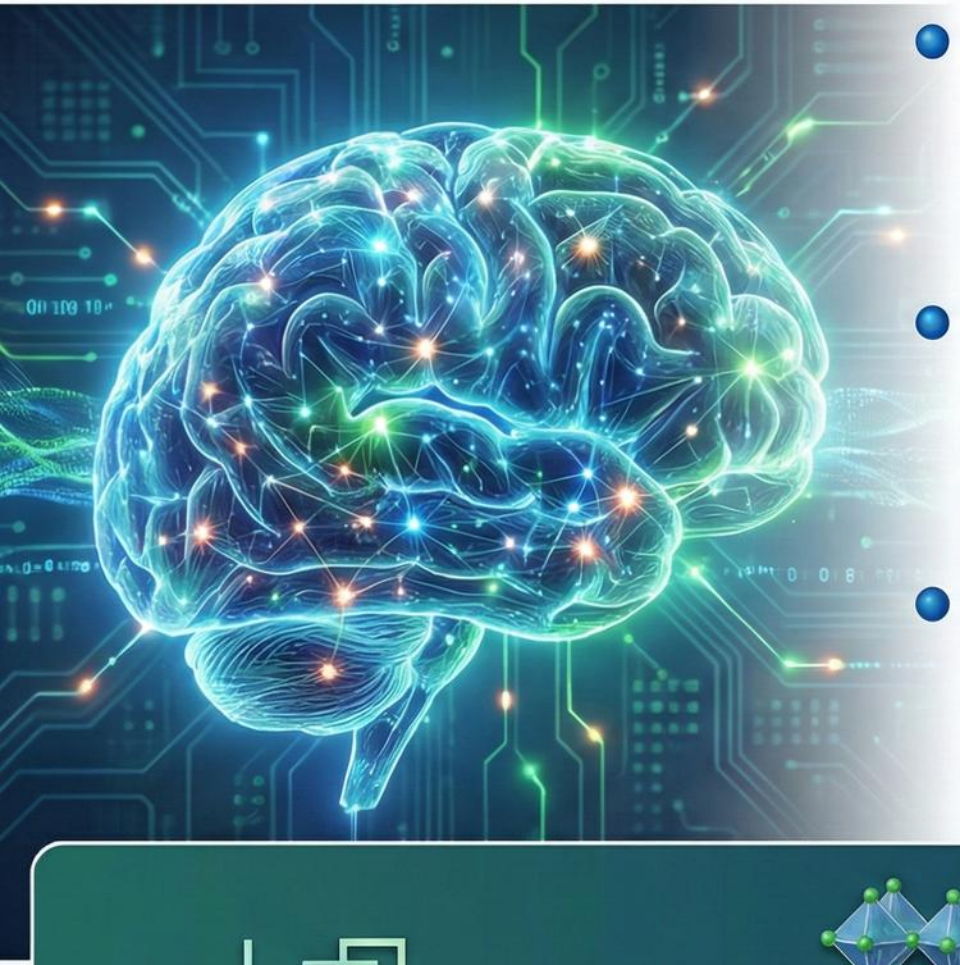
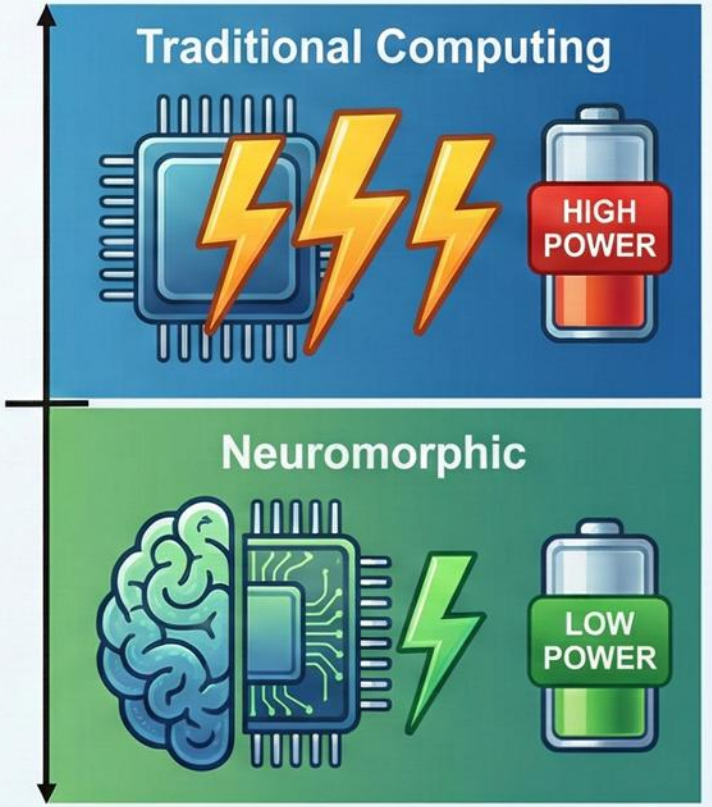
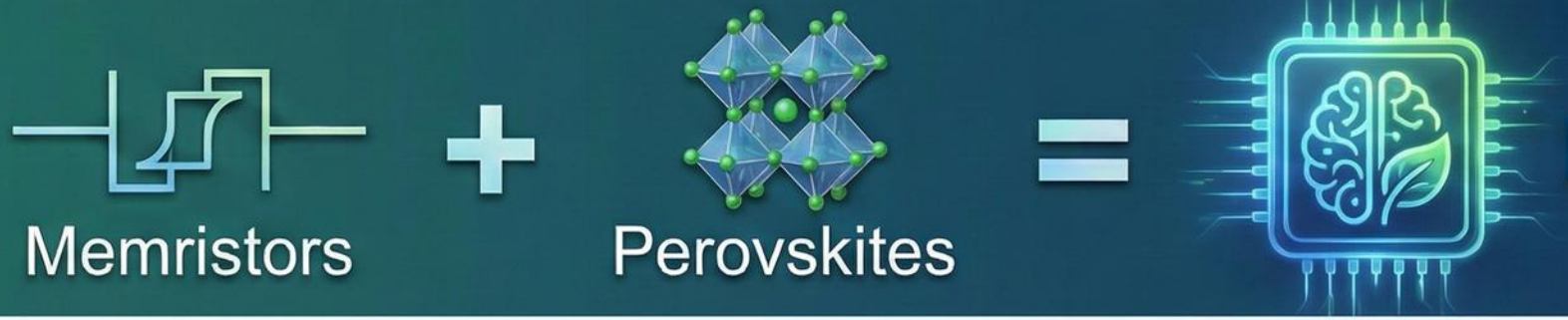
Neuromorphic Computing: The Next Frontier in AI Hardware

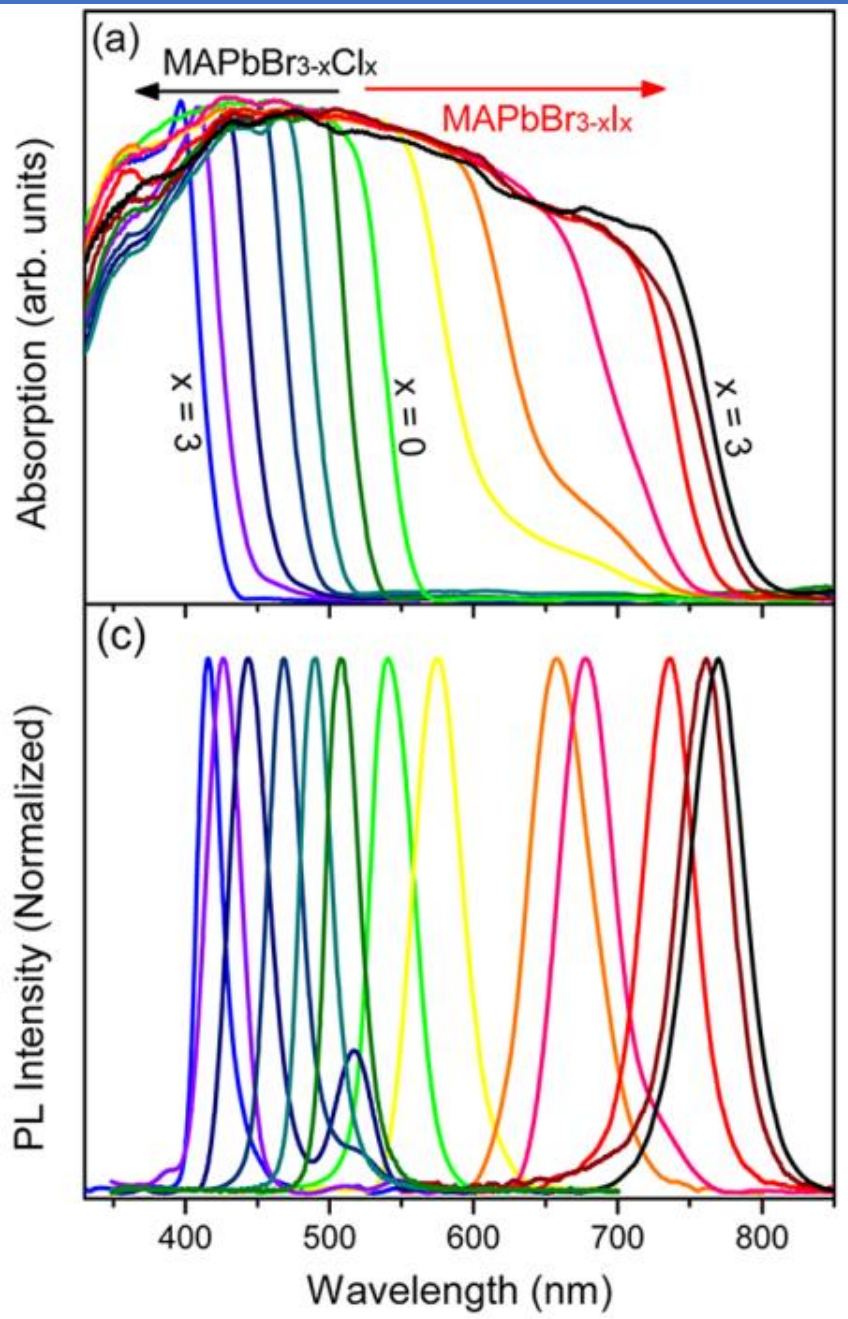


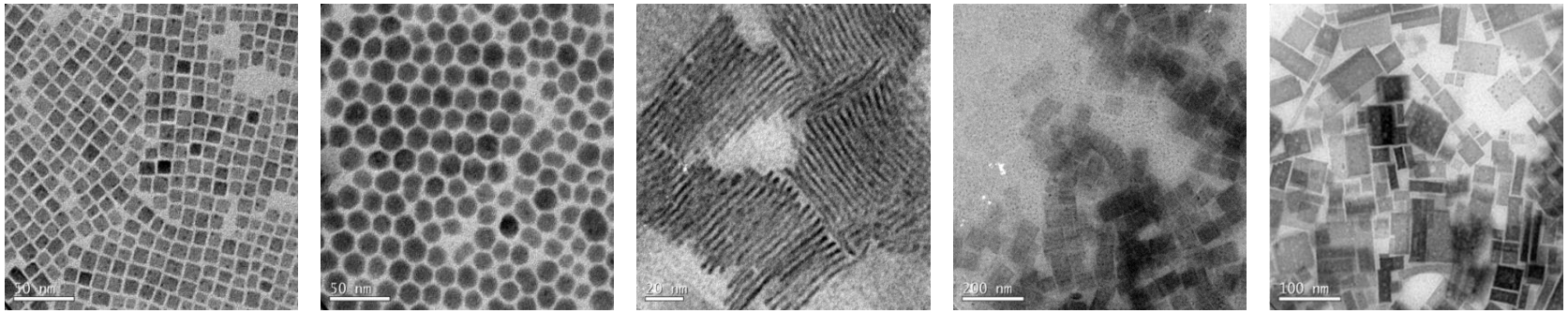
- Current AI hardware consumes enormous energy (GPUs: 250-400W per chip)
- Brain-inspired neuromorphic computing offers 1000× energy efficiency
- Challenge: Need sustainable, low-power memristive materials for artificial synapses





Nanocrystals





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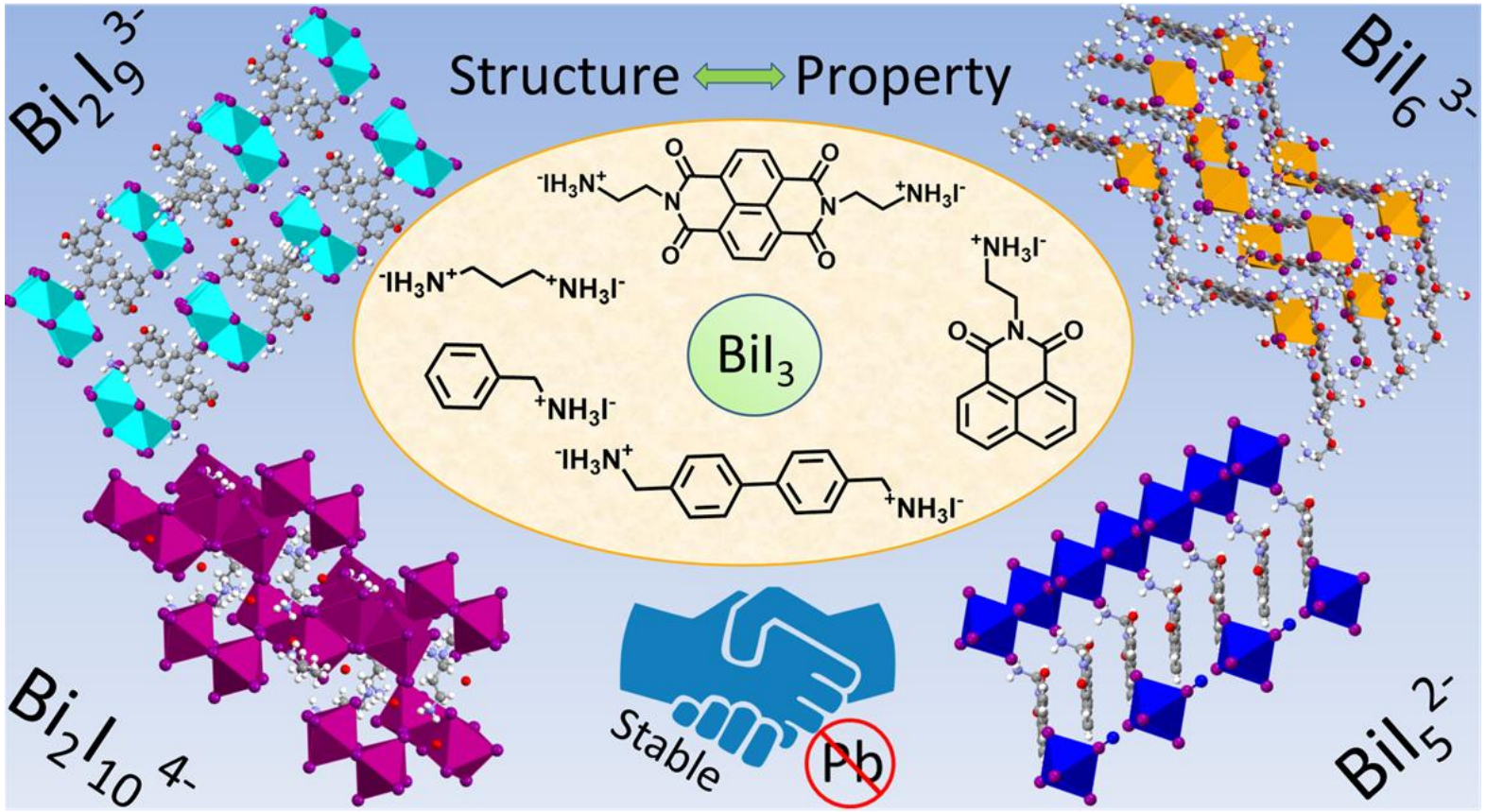
Low-Dimensional Lead-Free Hybrid Metal Halides



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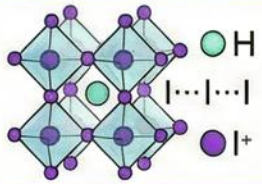
Bridging Materials Science and Neuromorphic Engineering

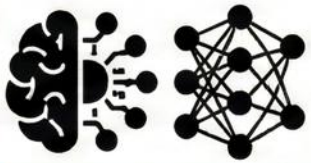


Materials Design (CSIR-NIIST)

→ Bismuth/tin halide perovskites
→ Controlled I···I coupling

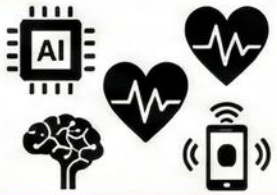
Memristive Devices (Joint)

→ Synaptic plasticity
→ Multi-state switching
→ Ultra-low power



Neuromorphic Systems (AGH)

→ Reservoir computing
→ Echo state machines
→ Pattern recognition



Applications

→ Edge AI computing
→ Biomedical signal processing
→ Low-power IoT devices