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Supervisor's contact details

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Title of the project

Sustainable and Highly Durable Nanowires for Flexible Electronics

MSCA-PF Research Panel

☒ Chemistry (CHE)

☐ Social Sciences and Humanities (SOC)

☐ Economic Sciences (ECO)

☒ Information Science and Engineering (ENG)

☐ Environment and Geosciences (ENV)

☐ Life Sciences (LIF)

☐ Mathematics (MAT)

☐ Physics (PHY)

Description of the project

Electronic waste is growing day by day and climate action calls for making devices sustainable, highly durable and recyclable. The goal of the proposed project is to develop methods for producing very high aspect ratio nanowires with excellent mechanical durability, which can be integrated into flexible electronic devices. The nanowires will be synthesized using a combination of bottom-up and top-down techniques, using sustainable and highly durable materials. The physical and mechanical properties will be characterized using various advanced characterization tools. The ultimate aim is to create sustainable nanowires that can withstand fatigue resistant repeated bending and stretching, making them ideal for use in highly durable wearable electronics and other flexible devices. The fellow's anticipated role is:

- Designing and implementing experiments to synthesize nanowires using sustainable and highly durable materials, including using both bottom-up and top-down approaches.
- Characterizing the physical and mechanical properties of the nanowires using advanced microscopy, spectroscopy and in-situ nanoindentation techniques.

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- Developing and testing methods for integrating the nanowires into flexible electronic devices.
- Collaborating with other researchers and team members to ensure the success of the project and its long-term impact.

Research objectives or research questions of the project

- What are the most sustainable and durable materials that can be used for synthesizing the nanowires, and how can their properties be optimized for mechanical durability and flexibility?
- How can we characterize the physical and mechanical properties of the synthesized nanowires using advanced microscopy and spectroscopy tools, and what insights can be gained from these analyses?
- What factors contribute to the fatigue resistance of the nanowires when subjected to repeated bending and stretching, and how can these properties be optimized for specific applications?
- How can the synthesized nanowires be integrated into flexible electronic devices, and what challenges need to be overcome to ensure their long-term durability and sustainability?
- How do the environmental impacts of the nanowire synthesis process compare to other methods of producing flexible electronic devices, and what steps can be taken to minimize the carbon footprint of the fabrication process?