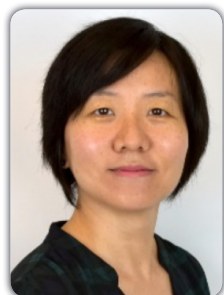


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# MATERIALS SCIENCE AND ENGINEERING

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## Chen Yang

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### Nanoladders for directional axonal outgrowth and functional regeneration

Disruption of nerve connections between the brain and the rest of the body caused by spinal cord injury could result in paralysis. Recovery is challenging due to failure in spontaneous neural regeneration. None of current clinical treatment targets neural regeneration and only limited functional recovery has been reported. Nanomaterials have been harnessed to promote neuronal growth *in vitro*. In this work, we present a new nanomaterial scaffold, interfacing and stimulating neural systems mechanically. Specifically, inspired by the hierarchically organized axon bundles in the spinal cord, we developed a nanoladder structure composed of a longitudinal micrometer-diameter fiber and multiple nanoscale protrusions to both guide macroscale neural growth and facilitate neurite formation at the subcellular level. Directional and promoted neurite growth is shown on the nanoladder structure. Directional growth and functional connection of organotypic spinal slices are confirmed through fluorescence labeled imaging and electrophysiology measurements on the nanoladder platform. We also demonstrated that such nanoladder concept can be used to further create self-folded 3D scaffolds for *in vivo* studies and clinical tests.

### Biography

Chen Yang has pursued her Doctoral degree in Chemistry from Harvard. She has worked as an Associate in McKinsey & Co. She had joined Department of Chemistry and Department of Physics and Astronomy at Purdue University and moved to Boston University, Department of Electrical and Computer Engineering, Department of Chemistry. Her research interest is focusing on nanomaterials for the potential applications in nanoscale devices, biological and energy applications. She has won the NSF Career Award (2009-2014), Purdue Seed of Success Award and Purdue Outstanding Adviser Award. She had served as a Guest Editor for *Journal of Electronic Materials* and currently serves on Editorial Board of *Scientific Reports*.

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