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Water supply problems are related to water availabilities during a certain sessions as well as to population density and agricultural and industrial areas. Therefore, there is an increasing demand for new sources of water, particularly from non-traditional water supplies. Fog water collectors (FWCs) are one such example where a solid material structure is engineered to promote condensation of water from the local environment. Examples of FWCs occur extensively in nature and include leaves and needles of trees that are able to collect water in fogs effectively. Artificial collectors that mimick biological structures to produce a flow of portable water are manufactured today, but they are typically large and lack the efficient small-scale details found in biology. Thus, the manufacturing of more effective FWCs requires better optimization of resultant FWC structures. Nanofibres have become one of the greatest exploratory subjects for academics, and largest fascinating business elements for many industries. Many of today's most successful companies and organizations have been realizing the importance of nanofibres. In Nano4Water project, we want to use existing designs of FWC and increase the efficiency of water collection by incorporating nanofibres into already used polymer meshes. With incorporated nanofibres it will be possible to optimise mesh openings for capturing larger fractions of droplets passing through with smaller droplets from a fog. Part of spacing in the fibre mesh can be easily filled with nanofibre meshes using the same construction principle of FWC. This proposal is based on fundamental studies with the main goal of investigation of nanofibre interaction with water droplet to increase the efficiency of FWC in water collection and increase their functionalities by incorporating piezoelectric nanofibres for energy generation.
Evaluation of water-nanofibre interaction at nanometre resolution will progress beyond the current state-of-the-art and will combine the skills of physical and materials scientists to develop future electrospun nanofibre network applications in water and energy engineering. Harvesting ambient mechanical energy at the nonometer scale holds a great promise for powering small electronic devices. This sustainable and green innovation will be able to provide water and energy mainly for domestic purposes. Introducing this technology will have not only an economic impact but impact on health and social well-being. Most importantly, gained knowledge during the project will bring the fundamental understanding of wetting phenomena at nanoscale.