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Microtubular NEMS and MEMS devices

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Multifunctional nanomembranes with outstanding properties are self-assembled into fully integrative microtubular NEMS and MEMS devices (NanoMEMS). NanoMEMS are attractive for a broad range of applications and scientific research fields ranging from new concepts for electronic, photonic and energy storage devices to targeted drug delivery and reproduction technologies. NanoMEMS are used to construct ultra-compact microbatteries and supercapacitors as well as novel highly efficient cylindrical electronic circuitry, nanophotonic cavities, 3D magnetic sensors and optofluidic components towards the implementation of a lab-in-a-tube system. They are also useful to study basic mechanisms of single cancer and stem cell migration, growth and mitosis in realistic 3D confined environments. Off-chip applications include biomimetic microelectronics for regenerative cuff implants and the development of hybrid microbiorobotic motors for paradigm shifting reproduction technologies. Cellular cyborg machinery is put forth for novel schemes in targeted drug delivery and cancer treatment.