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| הפקולטה להנדסה כימית  ע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering**

**&**

**Department of Biomedical Engineering**

**Wednesday, March 10th, 2021 at 15:00**

**Online seminar via Zoom**

 <https://technion.zoom.us/j/97591164072>

**Bioinspired microrobots for applications in medicine**

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The idea of a swallowable surgeon, where a miniaturized robotic device can be administered in the body, and can autonomously diagnose and treat diseases, has intrigued scientists and engineers for years. Recent times have seen an explosive growth towards the development of such systems, which is mainly propelled by the adoption of novel 3D micro/nanofabrication techniques and conglomeration of concepts from materials science, physics and bioengineering. This class of robots, which are often too small to accommodate conventional power electronics or batteries, rely on inherent material properties or wireless power coupling for their activity inside the body. In the first part of the talk, we will take a brief look at a microrobotic system, where bacteria inspired helical microswimmers showed a rich dynamics, that eventually lead to a novel technique of measuring the local viscoelastic properties of a medium. We will then explore a class of origami inspired sub millimeter scale robots which uses intrinsic stress mismatch between thin films to drive autonomous shape change. Recently we have used this principle to develop dust sized therapeutic robots, which can self-latch on tissue in response to the physiological temperature. These robots could be loaded with drugs and delivered to the gastrointestinal (GI) tract of animals and in the process could extend the therapeutic window of a model painkiller. Recent results also show the possibility of targeted therapy, where similar microrobots could be positioned at a desired location on tissue using clinical instrumentation. We will end the talk with the example of an autonomous ingestible microinjection system which can overcome the epithelial barrier in the GI tract to accomplish delivery of macromolecular drugs.