

## MECHANICAL ENGINEERING STUDENT SEMINAR

Thursday, June 22, 2023, at 13:00, D. Dan and Betty Kahn Building, Auditorium 1.

Online: <https://technion.zoom.us/j/92191542245>

### Biomimetic adhesive films combining the functional principle of different biological systems

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Reversible and glue-free attachment solutions for dry and wet surfaces are required in different engineering fields such as climbing robots, mobile sensor platforms and biomedicine, to name a few. Detachment resistance independent of the applied force direction is generally required. Currently, many proposed glue-free attachment devices rely on a single biomimetic adhesive fibrillar micro-texture type. Unfortunately, in contrast to biological attachment systems, these biomimetic devices fail to produce adequate adhesion and friction forces simultaneously.

In nature, some animals have developed exceptional attachment mechanisms based on combined fibrillar elements of different shapes and functions, such as in the case of the leaf beetle *Gastrophysa Viridula* (Coleoptera: Chrysomelidae). These animals manage to provide load bearing capacity in the normal and tangential directions by controlling the activation/passivation of the different adhesive elements on their feet.

Inspired by nature (see Fig. 1a), adhesive films combining different biomimetic micro-textures, micro-spatulae and micro-mushroom (see Fig. 1b), were prepared and analyzed in this study for the first time. The tribological performances of these combinations, i.e. adhesion, friction, and peeling resistance have been investigated experimentally using a customized tribometer designed and constructed specially to this end. A parametric study of various parameters was conducted to evaluate the potential of textures' combination for different applications, in particular in the biomedical field.

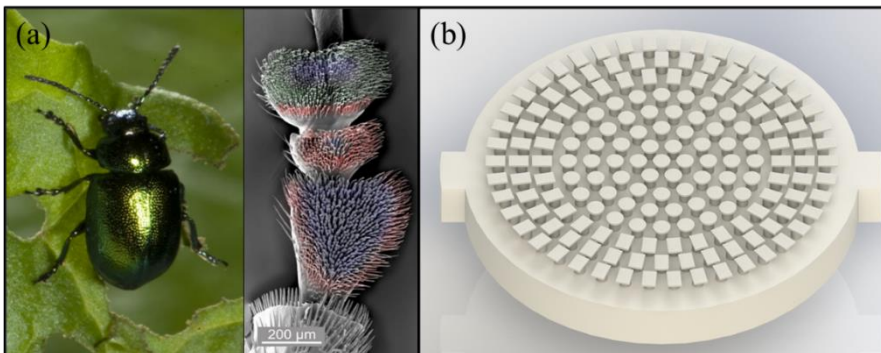


Figure 1: (a) The leaf beetle *Gastrophysa Viridula* and the attachment pads on its hind leg tarsus with different textures; (b) Biomimetic attachment system casted from PDMS

Note: the seminar will be given in Hebrew