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Friction measurement of modified PDMS surfaces inspired by *Malayopython Reticulatus*

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Highlights

- Imprinting snake ventral scales on PDMS provides frictional anisotropy.
- Displays higher frictional anisotropy compared to smooth PDMS.
- the COF of the samples increases as more force applied by the gloved finger.
- sliding in rostral direction generates higher friction.
- sliding in lateral direction generates lower friction.

Abstract

The lack of limbs on snakes enables its ventral scales to be in almost constant contact with the substrate. Their skin is presumably adapted to generate high and low friction to slither. This frictional characteristics in snakes were hypothesized to be contributed by the be tooth-shaped or denticle-like microstructures found on the snake ventral scales. The frictional properties of the microstructures found on snake ventral scales was studied and its feasibility as an inspiration for surface modifications was observed. This study was carried out to analyze the frictional anisotropy exhibit by the snake ventral scale microstructures and also how it changes the frictional properties of the PDMS surface when the microstructures are replicated on to it. The PDMS embedded-elastomeric stamping method was used in this experiment to replicate the snake ventral scales onto the PDMS. Based on the data collected the microstructures on the snake ventral scales does exhibit frictional anisotropy. The PDMS with replicated snakeskin microstructures displays higher COF compared to PDMS with smooth surface. When sliding on most types of surfaces, the COF of real snakeskin and replicated snakeskin is higher if the surface is semi wet. Whereas for smooth PDMS the COF is lower when the surfaces are semi wet. Generally, from both experiments, when the replicated snakeskin is sliding on the surface in the lateral direction, it is observed that the COF is the lowest