Abstract Submitted
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Oil-Impregnated Polyethylene Films[1] RANIT MUKHERJEE, MOHAMMAD HABIBI, ZIAD RASHED, Virginia Tech, OTACILIO BERBERT, SHAWN SHI, Bemis North America, JONATHAN BOREYKO, Virginia Tech — Slippery liquid-infused porous surfaces (SLIPS) minimize the contact angle hysteresis of a wide range of liquids and aqueous food products. Although hydrophobic polymers are often used as the porous substrate for SLIPS, the choice of polymer has been limited to silicone-based or fluorine-based materials. Hydrocarbon-based polymers, such as polyethylene, are cost effective and widely used in food packaging applications where SLIPS would be highly desirable. However, to date there have been no reports on using polyethylene as a SLIPS substrate, as it is considered highly impermeable. Here, we show that thin films of low-density polyethylene can be stably impregnated with carbon-based oils without requiring any surface modification. Wicking tests reveal that oils with sufficient chemical compatibility follow Washburn's equation. The nanometric effective pore size of the polyethylene does result in a very low wicking speed, but by using micro-thin films and a drawdown coater, impregnation can still be completed in under one second. The oil-impregnated polyethylene films promoted ultra-slippery behavior for water, ketchup, and yogurt while remaining durable even after being submerged in ketchup for over one month.

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