Stimuli-responsive Secreting Liquid Crystal Polymer Coatings

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Liquid secretion is a vital biological process that protects organisms by forming defensive layers, regulating temperature, transporting substances, and facilitating chemical reactions. This adaptive behavior has inspired the creation of man-made materials capable of secreting liquids in response to environmental stimuli. To date, methods for inducing liquid secretion from solids have been limited to passive or temperature-responsive release.[1] Here we present innovative techniques for fabricating on-demand secreting coatings using liquid crystal networks (LCNs). By photopolymerizing liquid crystal monomers in the presence of non-reactive liquid crystals, we create a porous network within the coating. This coating can release liquids in response to various environmental triggers, such as light, electricity, or heat. Besides, depending on the desired alignment, the resultant coating can secrete liquids from the surface either locally or globally.[2] Given this property, we can program complex molecular alignment architectures and let the liquid be released locally.[3] We further explored the performance of our coatings applied for tuning surface adhesion, liquid transfer, control of chemical reaction, and drug delivery, which opens up their potential for artificial robotic skins, microfluidic platforms, and smart biomedical coatings.[4]

References

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