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Development of Novel, Skin-Friendly Glycerol-Silicone Hybrid Adhesives

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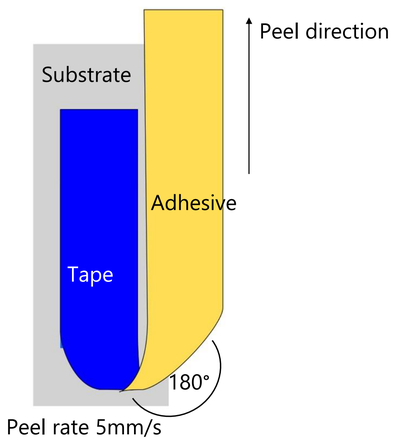
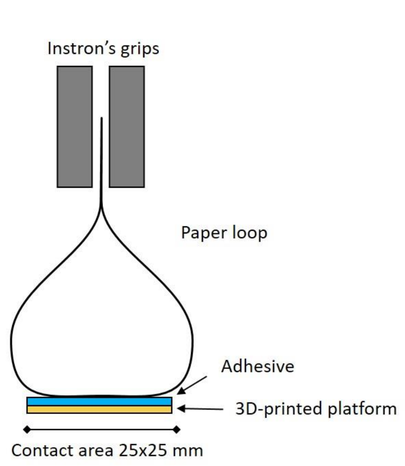
Introduction

Within the field of advanced wound care, silicone adhesives are currently the preferred, state-of-the-art adhesive system due to their gentle skin adhesion properties[1]. Silicone adhesives possess excellent oxygen permeability[2] but poor water transmission due to their inherent hydrophobicity. Here, we present a novel glycerol-silicone[3] hybrid adhesive with improved fluid handling due to the incorporation of emulsified glycerol; improved permeability through the silicone layer due to the presence of glycerol; maintained adhesion during perspiration, as a results of improved fluid handling and permeability. Additionally, the adhesive performance is proved not compromised by the incorporation of glycerol.

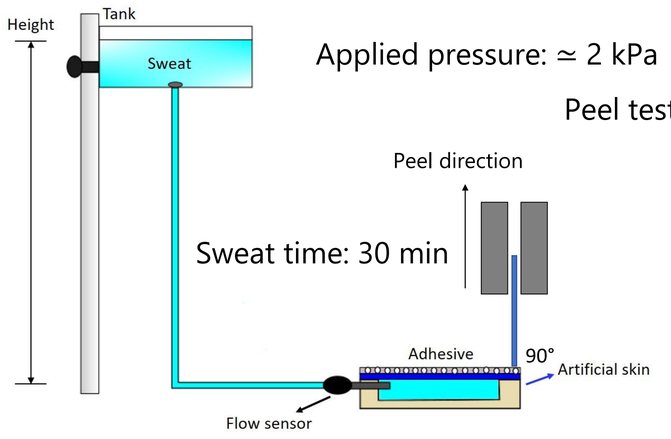
Peel Test – TM0037

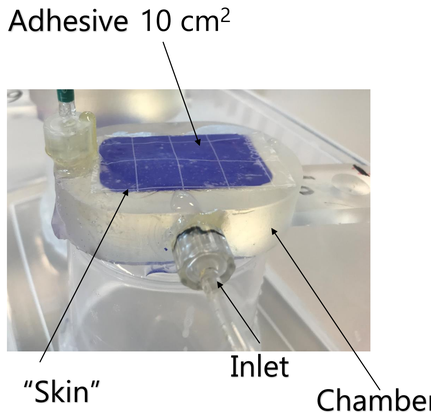


Tack Test – Reversed ASTM 6195-D03

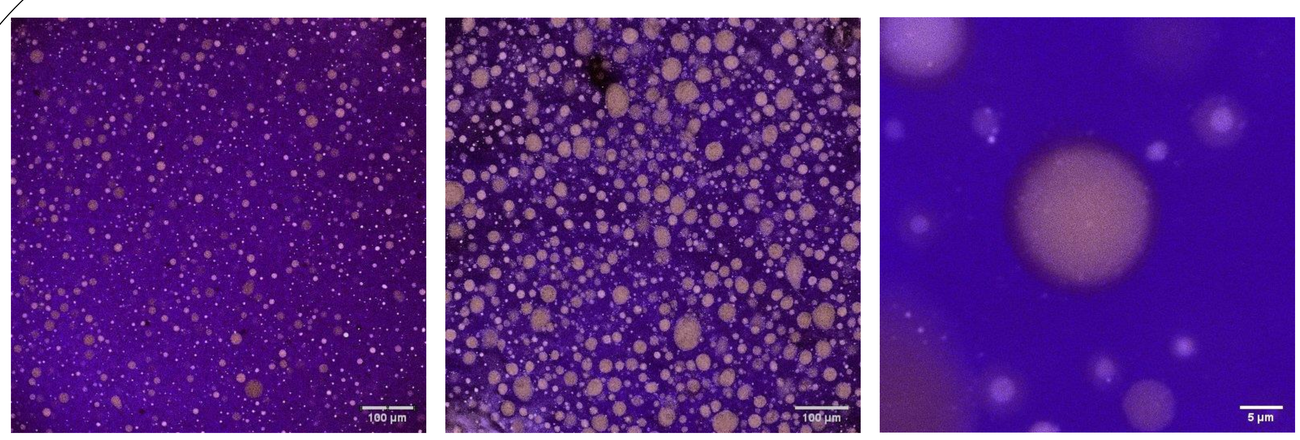


Perspirations experiments[4] and evaluation of adhesive performance



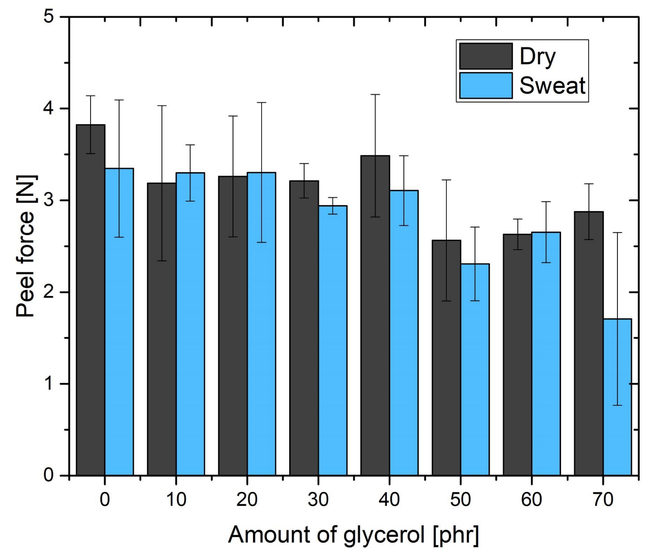


Morphology of Adhesives

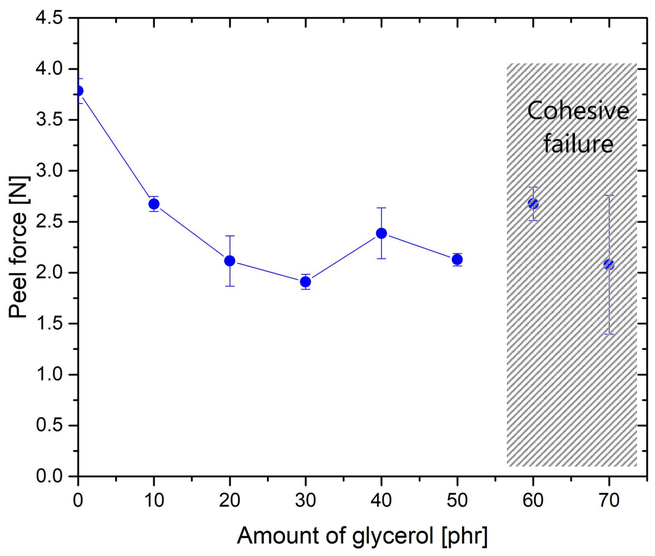


Glycerol domains incorporated in the silicone matrix characterized by confocal microscope. Upon crosslinking of the silicone phase, glycerol-silicone hybrid adhesives were obtained, with glycerol embedded in the polymer in the form of discrete droplets. We labeled each phase with different fluorescent color dyes and we analyzed the structure with confocal microscope. Morphology's study showed that the higher is the glycerol loading, the more tightly packed the domains are and the thinner the spacing between them becomes.

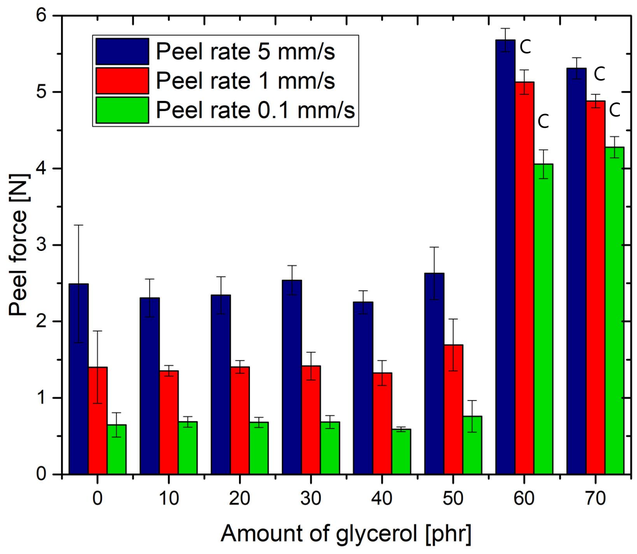
Perspirations Experiments and Evaluation of Adhesive Performance



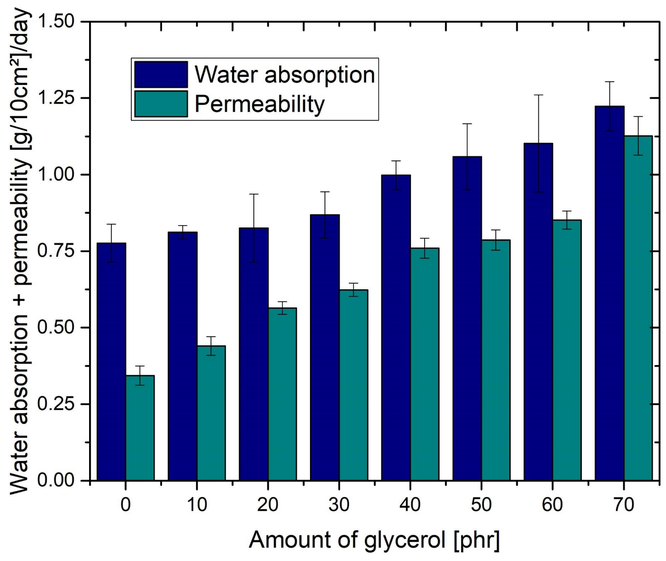
Peel Test on Stainless Steel Plates



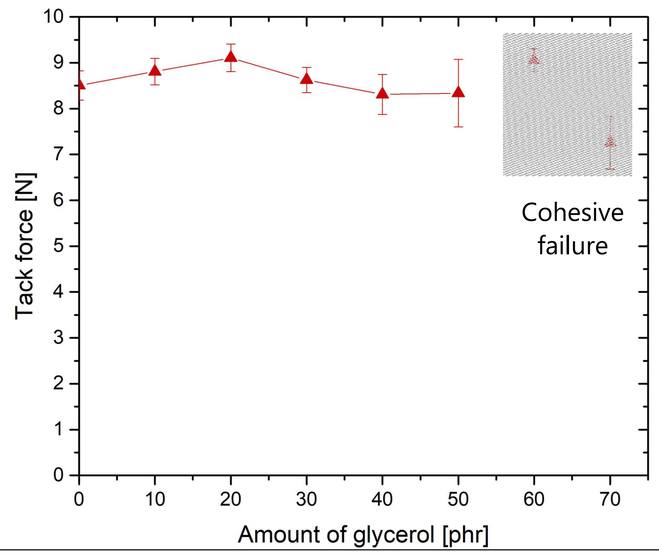
Peel Test on "Skin" Substrate



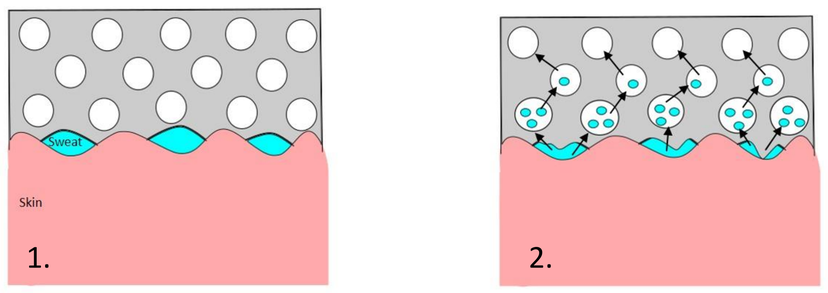
Water Absorption + Permeability after 24h – TM0291



Tack Test



Water Absorption Mechanism



The water absorption is an effect of building up osmotic pressure. As water moves down its osmotic potential gradient, it starts to fill the glycerol domains embedded in the silicone

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Acknowledgments

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