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DEVELOPMENT OF UV PHOTOPOLYMERIZED FILM BY USING METHYL ACRYLATE AND KONJAC GLUCOMANNAN FOR POTENTIAL USE AS ARTIFICIAL SKIN

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SUMMARY

Since the invention of artificial skin by Yannas and Burke in the 1980s, a variety of artificial skin has been introduced to the market. These artificial skins are used to replace epidermis and dermis layers, with some mimicking the extracellular matrix (ECM) of the skin. Cost remain a hindrance to wider use of artificial skin, apart from its compatibility to various requirements of skin treatment. Using a combination of natural and synthetic materials to develop artificial skin may solve these problems. The use of natural and synthetic materials to develop artificial skin have many advantages. Natural material have excellent biocompatibility while synthetic material provides flexibility in altering the properties of the artificial skin made.

In this study, methyl acrylates (MA) and konjac glucomannan (KGM) were mixed together and UV-polymerized to obtain a layer of film that can be potentially used as artificial skin. UV polymerization provides high rates of polymerization thus allowing for a more efficient crosslinking of the monomers. For UV polymerization of the film, polyethylene glycol diacrylate (PEGDA) acted as crosslinker and Irgacure 2959 was used as photoinitiator in the experiment. All of the other components were kept at the same concentrations except for MA. The film was then left under UV light for 6-15 minutes for it to be polymerized.

The films were developed using three concentrations of MA (30%, 40%, and 50%). Degradation test, differential scanning calorimetry (DSC), Fourier transform infrared spectroscopy (FTIR), and contact angle measurement were used as parameters to determine the suitability of the film to be used as artificial skin. FTIR results showed both MA and KGM in the films, which proved the mixability and presence of both substances. Higher concentration of MA slows down degradation rate of the film, as the crosslink density of the polymers was higher. The wettability of the films also decreased with increased concentration of MA. Results from this experiment showed the effect of MA concentration on the composition and crosslink density of the films. The variation in concentration of MA used in this study had produced KGM-MA films with different characteristics which in turn will greatly helps in determining its potential use as artificial skin in the future.