

Electrospun Alginate Nanofibers Containing Spirulina Extract Double-Layered with Polycaprolactone Nanofibers

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Abstract : Nanofibrous sheets are of interest in the beauty industries due to the properties of moisturizing, adhesion to skin and delivery of nutrient materials. The benefit and function of the cosmetic products should not be considered without safety thus a non-toxic manufacturing process is ideal when fabricating the products. In this study, we have developed cosmetic patches consisting of alginate and Spirulina extract, a marine resource which has antibacterial and antioxidant effects, without addition of harmful cross-linkers. The patches obtained their structural stabilities by layer-upon-layer electrospinning of an alginate layer on a formerly spread polycaprolactone (PCL) layer instead of crosslinking method. The morphological characteristics, release of Spirulina extract, water absorption, skin adhesiveness and cytotoxicity of the double-layered patches were assessed. The image of scanning electron microscopy (SEM) showed that the addition of Spirulina extract has made the fiber diameter of alginate layers thinner. Impregnation of Spirulina extract increased their hydrophilicity, moisture absorption ability and skin adhesive ability. In addition, wetting the pre-dried patches resulted in releasing the Spirulina extract within 30 min. The patches were detected to have no cytotoxicity in the human keratinocyte cell-based MTT assay, but rather showed increased cell viability. All the results indicate the bioactive and hydro-adhesive double-layered patches have an excellent applicability to bioproducts for personal skin care in the trend of 'A mask pack a day'.

Keywords : alginate, cosmetic patch, electrospun nanofiber, polycaprolactone, Spirulina extract

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