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Microneedles from fishscale nanocellulose blends using low temperature mechanical press method

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A fish scale biopolymer blended with nanocellulose crystals is used for production of microneedles by appliying mechanical press microfabrication, and the effect of nanocelullose on the microfabrication, water absorption, moisture stability and mechanical properties of the microneedles are reported. The results show that microneedles produced from the nanocellulose loaded fish scale biopolymer requires higher temperature for micromoulding (80 o C + 5 o C) than microneedles from only fish scale biopolymer which were mouldable at 50 o C + 5 o C. The mechanical properties of the fish scale biopolymer nanocellulose (FSBPNC) films showed that the addition of nanocellulose (NC) resulted in lower elongation and higher tensile stress compared to fish scale biopolymer (FSBP) films. The nanocellulose also prevented dissolution of the needles and absorbed up to 300 % and 234 % its own weight in water (8 and 12 % w/w NC/FSBP), whereas FSBP films dissolved completely within 1 minute, indicating that the FSBPNC films can be used to produce microneedles with prolonged dissolution rate. FTIR spectrometry of the FSBP films was compared with the FSBPNC films and the NC gels. The FTIR showed typical peaks for fish scale polymer and nanocellulose with evidence of interactions. SEM micrographs showed relatively good dispersion of NC in FSBP at both NC contents corresponding to 8% and 12% w/w NC/FSBP respectively.

Biography

Ololade Olatunji is a Lecturer at the University of Lagos, Nigeria. She completed ar PhD in chemical engineering department Loughborough University UK. She has a number of publication in the area of microneedles for transdermal drug delivery and is recently editor of the book Natural Polymers industry techniques and application, Published by Springer (in production). She is also guest editor of the special Issue on Microneedles in the MDPI journal of Pharmaceutics. She previously served as Senior Research officer at the Federal Institute of Industrial Research Oshodi (FIIRO) in Lagos, Nigeria.

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