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## Using photo-modification to compatibilize nano-ZnO in development of starch-kefiran-ZnO green nanocomposite as food packaging material

**Amin Babaeighazvini**

School of Packaging, Michigan State University, East Lansing, MI, USA

In this study, the effect of UV-C light on starch-kefiran-ZnO (1%) primary solution in different exposure times (1, 6, and 12 h) was investigated. Starch-kefiran-ZnO (SKZ) solution was modified by UV irradiation in different time periods. Also, nano-ZnO (ZN) was used as a photo-initiator and reinforcement agent, simultaneously. Mechanical properties of the films were affected after the UV treatment. The tensile strength increased because of the enhanced interaction between the biopolymer mixture and nano filler but elongation at break was decreased. WVP decreased about 16% and dwindled to  $2.08 \times 10^{-10}$  g m<sup>-1</sup> s<sup>-1</sup> Pa<sup>-1</sup>. Water related properties (i.e. moisture content, moisture absorption, and solubility in water)

of the films decreased by UV-C exposure. On the other hand, UV absorption and water contact angle increased because of the better distribution of the ZNs in polymer matrix after the UV exposure. Better compatibility of the ZNs and the biopolymer matrix after UV treatment was confirmed by the SEM micrographs. Comparison of FTIR spectra before and after UV exposure showed slight shifts. It was due to some formed or deformed bonds inside of the nanocomposite matrix. The modified SKZ by UV could be an appropriate process to sanitizing and food packaging concurrently. As well as UV can be used as a nano-ZnO compatibilizer in food packaging materials.

babaeigh@msu.edu