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Solution-blown nanofiber mats from fish sarcoplasmic protein - DTU Orbit (08/11/2017)

Solution-blown nanofiber mats from fish sarcoplasmic protein

In the present work, solution-blowing was adopted to form nanofibers from fish sarcoplasmic proteins (FSPs). Nanofiber mats containing different weight ratios (up to 90/10) of FSP in the FSP/nylon 6 blended nanofibers were formed from formic acid solutions, and compared to electrospun fibers made from the same solutions. The nanofiber mats produced by the two methods were characterized in terms of FSP content, fiber diameter distribution, fiber mat porosity, and mass of the fibers collected. The mechanical strength of the solution-blown fibers was also measured. Overall, fibers made by the two techniques were similar, but with some exceptions. The fiber diameter of the electrospun fibers was slightly smaller than those made using solution-blowing, however in both cases the fiber diameter increased with increasing FSP content. Interestingly, for uniform fibers the stretchability of the fibers increased with increasing FSP content, indicated by an increased strain at rupture. Moreover, the mechanical tests showed that up to 50% of nylon 6 could be replaced with FSP without compromising the mechanical properties, compared to pure nylon 6 nanofibers. Comparison of the yield showed that the production rate of solution-blowing was increased 30-fold in relation to electrospinning. Overall, this study reveals FSP as an interesting biopolymeric alternative to synthetic polymers, and the introduction of FSP to nylon 6 provides a composite with controlled properties.

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