

Supporting Information

Enhancing Strength of Wool Fiber using Soy Flour Sugar-based ‘Green’ Crosslinker

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Figure S1. Pictures of control and treated wool slivers (a) control (b) wool-SFS (c) wool-OSFS MR 1, (d) wool-OSFS MR 1.5, (e) wool-OSFS MR 2, (f) wool-OSFS MR 2.5. All treatments carried out at 150°C for 20 min.

Optimization of NaIO_4 :SFS molar ratio.

Addition of oxidized soy flour sugars (OSFS) to soy flour (SF) shows an instantaneous color change due to Maillard reaction. Figure S1 shows the effect of addition of OSFS with different molar ratios of NaIO_4 :SFS from 0.5 to 2.5 on the color of SF. As seen in Figure S1, the color of the SF changes from off-white to yellow-brown with the increase in the oxidation of soy flour sugars (SFS) from 0.5 to 2 after which it remains constant. NaIO_4 :SF MR 2.5 showed maximum color change and thus was used to crosslink wool fibers. For the molar calculations, the molecular weight of SFS was assumed to be 342, which is the molecular weight of sucrose.

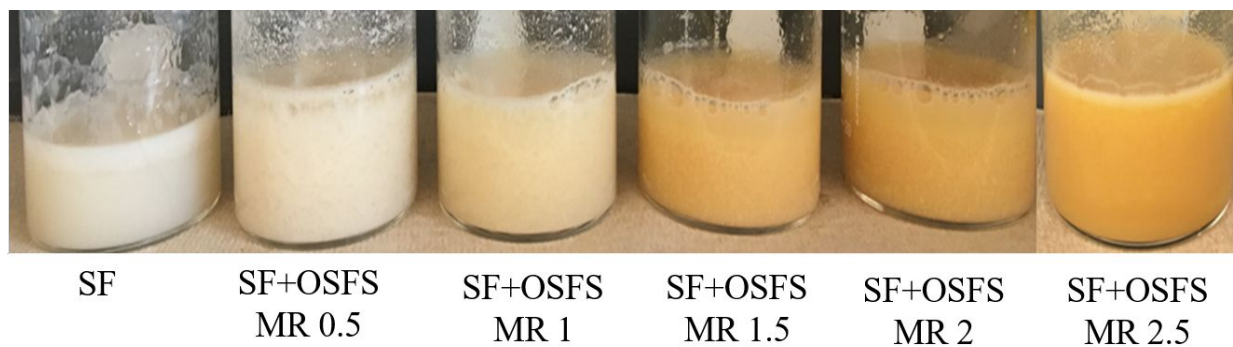


Figure S2. Effect of addition of OSFS with different molar ratios of NaIO_4 :SFS from 0.5 to 2.5 on the color of SF.

Optimization of $\text{BaCl}_2\text{:NaIO}_4$ molar ratio.

At the end of the oxidation of SFS, optimum amount of BaCl_2 was added to curb the oxidation reaction. When BaCl_2 is added to NaIO_3 , they react to form barium iodate $\text{Ba}(\text{IO}_3)_2$ which is insoluble in water at lower temperatures. The reaction mixture was refrigerated to precipitate $\text{Ba}(\text{IO}_3)_2$. Different molar ratios of $\text{BaCl}_2\text{:NaIO}_4$ (0, 0.5, 1 and 1.5) were added to the reaction mixture and placed in the refrigerator for 1 h. As seen in Figure S3, the parafilm on the beaker without BaCl_2 turns purple possibly due to the presence of free iodine fumes. With increase in the amount of BaCl_2 and the time in refrigerator, the purple color on the parafilm reduced. At MR 1.5, no purple color (no free iodine fumes) was observed and OSFS turned clear, indicating formation of $\text{Ba}(\text{IO}_3)_2$. The OSFS was then filtered to obtain OSFS. Thus, $\text{BaCl}_2\text{:NaIO}_4$ MR 1.5 was used to remove NaIO_3 from the reaction mixture.

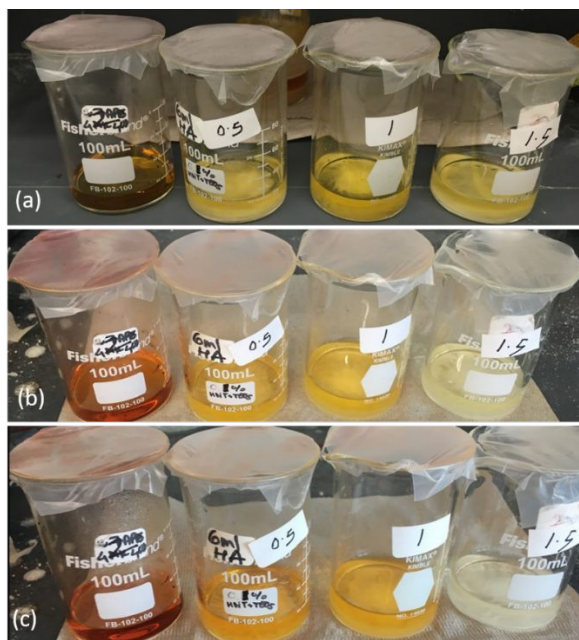


Figure S3. $\text{BaCl}_2\text{:NaIO}_4$ molar ratios of 0, 0.5, 1 and 1.5 (across a, b and c) added to OSFS (a) 15 min refrigerated (b) 30 min refrigerated (c) 1 h refrigerated.