

## Supporting Information

# Effect of Yerba Mate and Silk Fibroin Nanoparticles on the Migration Properties in Ethanolic Food Simulants and Composting Disintegrability of Recycled PLA Nanocomposites

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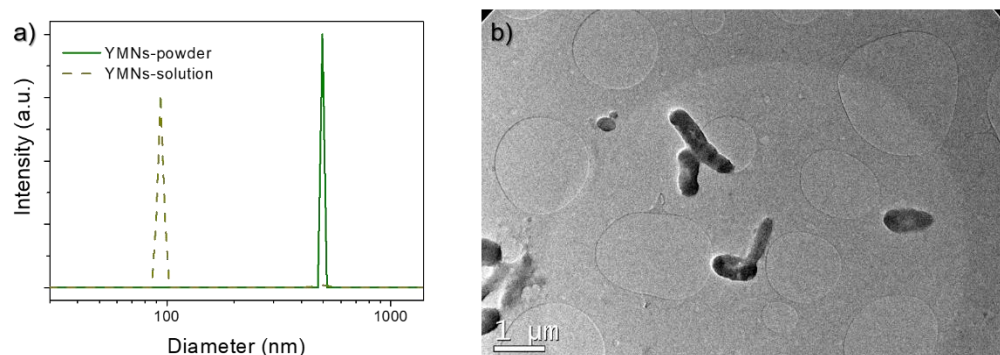
## Instrumental

The hydrodynamic size of either SFN or YMN was measured by means of dynamic light scattering (DLS). The obtained particles, in the powder form, were dispersed at 1 mg·mL<sup>-1</sup> in ultrapure deionized water by ultrasonication at 10% of amplitude for 1 minute with a Branson SFX550 (Emmerson Ultrasonic Corporation, Dansbury, USA) and further measured at 20 °C in a Zetasizer Nano series ZSP equipment (Malvern Instrument Ltd., Malvern, UK).

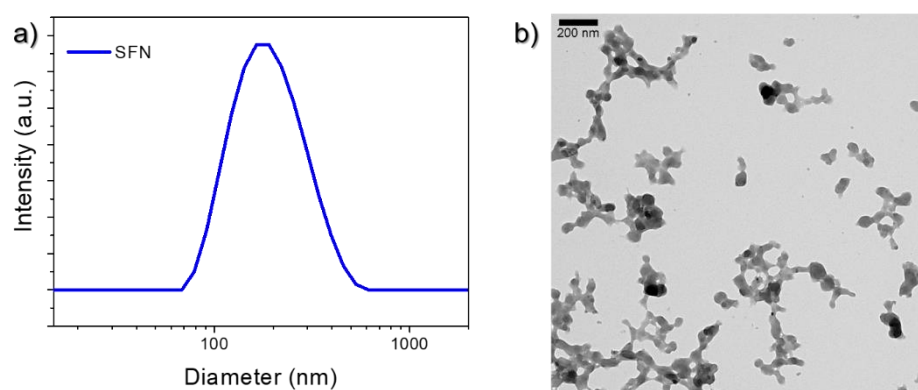
Transmission electron microscopy (TEM) measurements of SFN and YMN were carried out on a Zeiss EM902 (Zeiss, Oberkochen, Germany) and a JEOL JEM-1010 (JEOL Ltd., Tokyo, Japan) operating at 100kV, respectively. YMN suspension was prepared by dissolving 1 mg of YMN powder into 1 mL of water. One droplet of YMN suspension (1 mg mL<sup>-1</sup>) was deposited on carbon-coated copper grids and dried at room temperature during 25 min before TEM observation.

The cryo-fractured surface microstructure of the cross section of films was observed by means of field emission scanning electron microscopy (FE-SEM). Films were previously sputtered with a palladium/gold layer. PLAV, PLAR and PLA-YMN were observed in a JEOL JSM 7600F microscope (JEOL Ltd., Tokyo, Japan) operating at 5 kV and nanocomposite of PLAR loaded with 2% SFN was observed in a FE-SEM S8000 (Hitachi, Tokyo, Japan) at 20kV

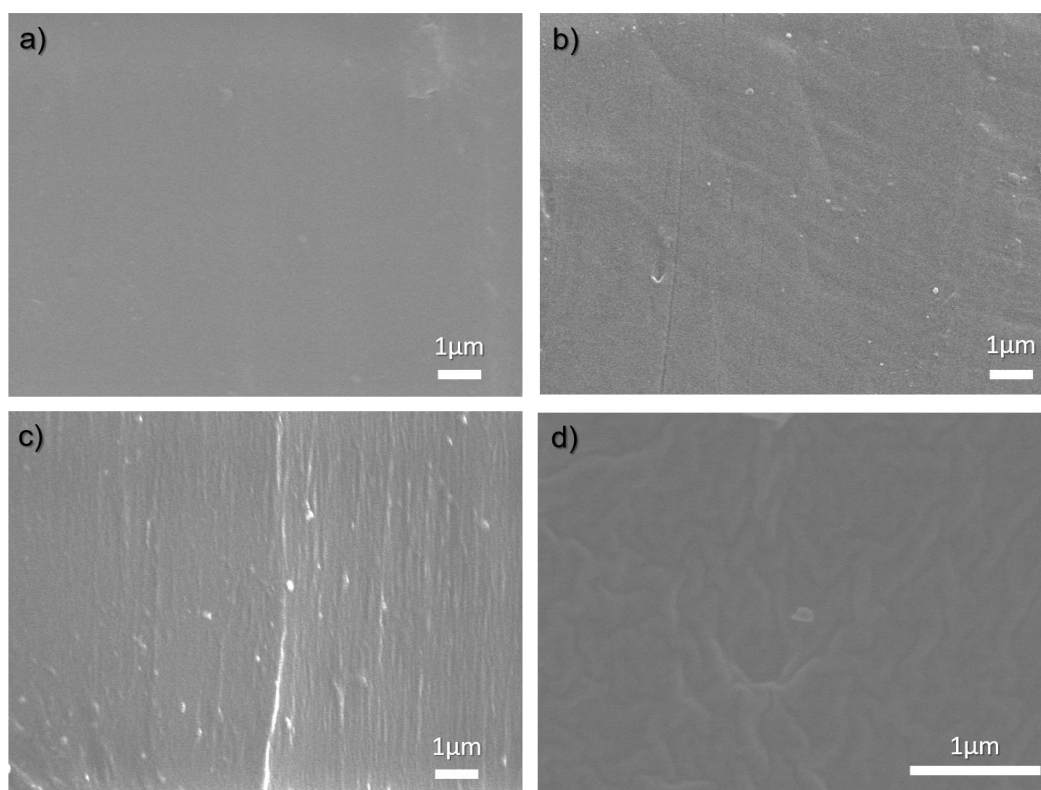
## Results



**Figure S1.** (a) DLS measurements of YMN solution and powder and (b) TEM image of YMN powder.



**Figure S2.** (a) DLS measurements of SFNs and (b) TEM image of SFNs powder.



**Figure S3.** FE-SEM images of: PLAV (a), PLAR (b), and nanocomposites: PLAR loaded with 1% wt. of YMN (c) and PLAR loaded with 2% wt. of SFN (d).