

Supporting Information

Fabrication of light-colored lignin microspheres for developing natural sunscreens with favorable UV absorbability and staining resistance

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Table S1. Active and inactive ingredients of commercial SPF 15 sunscreen lotion.

Lotion	Active ingredients	Inactive ingredients
Haiermian SPF15	Octinoxate Avobenzone Octocrylene TiO ₂	Water, Propanediol, Glyceryl Stearate, Potassium lauryl phosphate, Octyldodecanol, Caprylic/Capric triglyceride, Phenoxyethanol, Cetearyl alcohol, 4-Methylbenzyl camphor, Polydimethylsiloxane, Methylparaben, Propylparaben, Triethanolamine, Carbomer, Disodium EDTA, Acrylates/C10-30 Alkyl acrylate crosspolymer, Bisabolol, Butylated hydroxytoluene

Table S2. Structure parameter of initial lignin samples.

Samples	Element content (wt %)				OCH ₃ (wt %)	C ₉ structure unit
	C	H	O	S		
Eucalyptus kraft lignin	58.43	4.80	32.84	3.93	19.31	C ₉ H _{6.21} O _{3.03} S _{0.26} (OCH ₃) _{1.32}
Bamboo acetic acid lignin	63.55	6.27	30.18	--	15.97	C ₉ H _{8.89} O _{2.58} (OCH ₃) _{0.97}

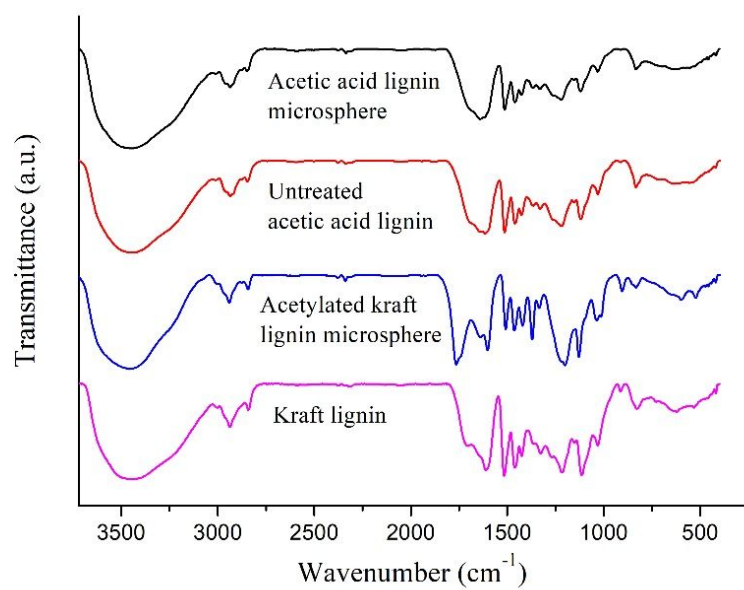


Fig. S1. FTIR spectra of lignin samples.

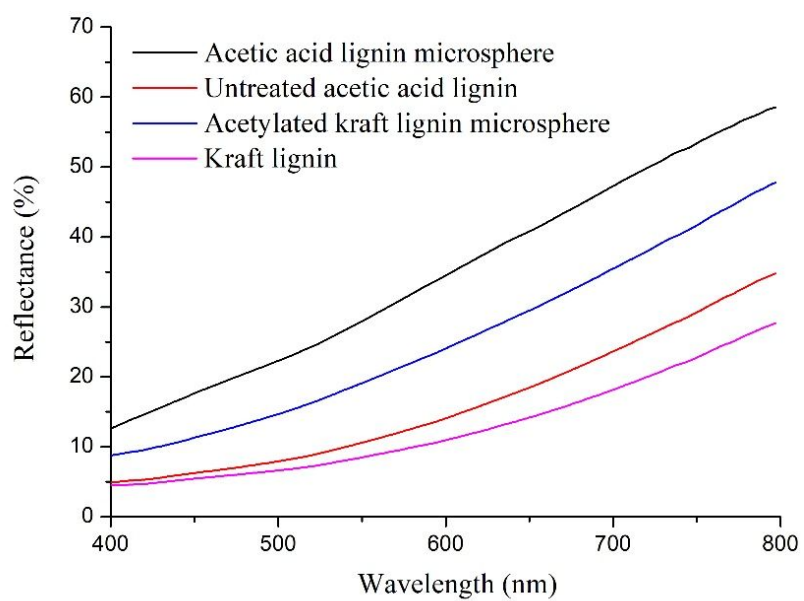


Fig. S2. Visible light diffusion spectra of lignin samples.

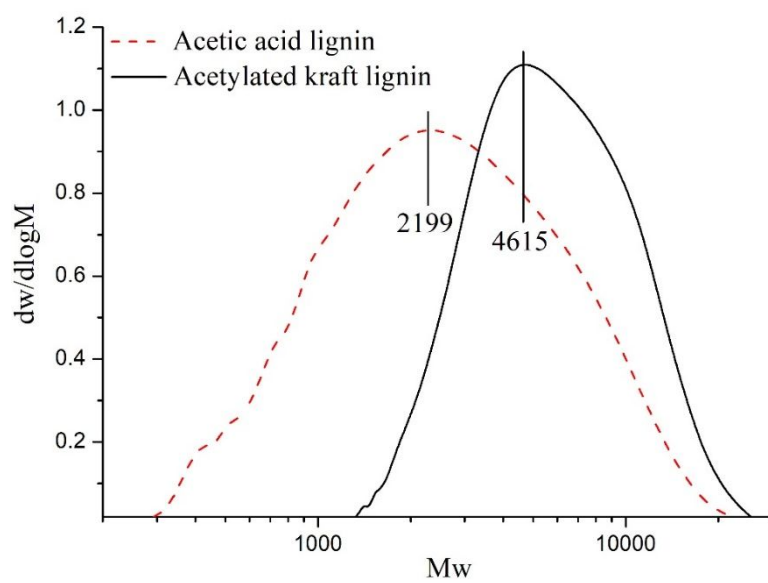


Fig. S3. Molecular weight distribution of lignin samples.