

Supplementary Materials: Potential UV-Protective Effect of Freestanding Biodegradable Nanosheet-Based Sunscreen Preparations in XPA-Deficient Mice

Tomomi Hatanaka, Khampeeraphan Ramphai, Shun Takimoto, Hiromi Kanda, Nami Motosugi, Minoru Kimura, Tomotaka Mabuchi, Midori Oyama, Tomoharu Takeuchi and Yosuke Okamura

Ultraviolet visible light absorption (UV-Vis) spectroscopy of nanosheet preparations and commercial sunscreen products.

To choose a suitable UV absorber for poly (L-lactic acid) (PLLA) nanosheet preparations, some fabrication trials were performed using several UV absorbers through a spin-coating-assisted layer-by-layer method using poly (vinyl alcohol) (PVA) membrane as a sacrificial layer [1–3]. Briefly, a sacrificial layer was made by spin-coating a substrate with 1.0% PVA aqueous solution, dried and spin-coated with a dichloromethane solution containing 1.0% PLLA and 0.5% a UV absorber. The sacrificial layer was removed by immersion in water, and a trial product was obtained after drying. The UV-Vis spectrums of trial products were measured with a UV spectrophotometer UV-2600 (Shimadzu, Kyoto, Japan) by adhering to a quartz plate having thickness of 2.0 mm and compared with those of commercial sunscreen products, which were applied to the plate at 2.0 mg/cm² [4].

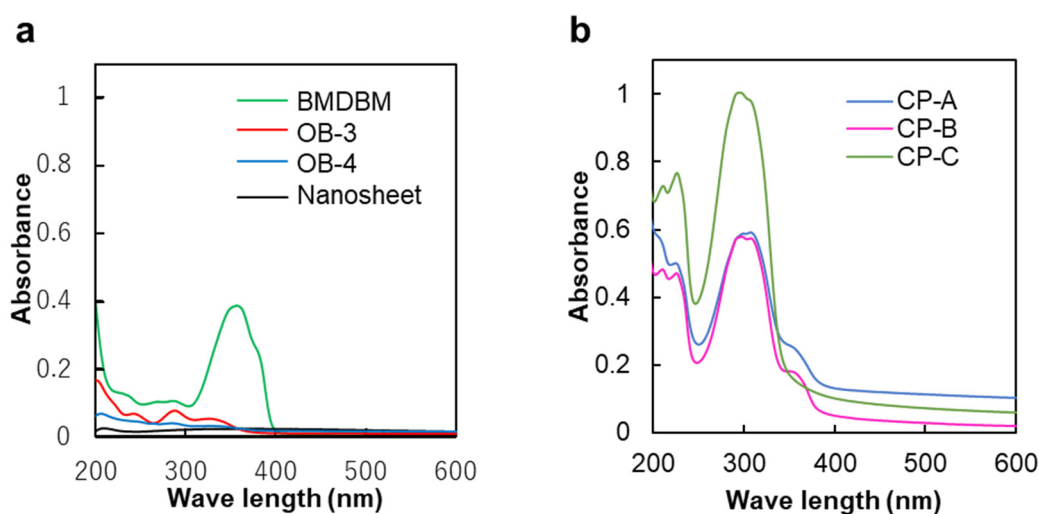


Figure S1. Ultraviolet visible light absorption spectra of nanosheet preparations and commercial sunscreen products. (a) Nanosheet preparations with and without avobenzone (BMDBM), oxybenzone-3 (OB-3) and oxybenzone-4 (OB-4). (b) Commercial sunscreen products (CP) A, B and C.

References

1. Fujie, T.; Okamura, Y.; Takeoka, S. Ubiquitous Transference of a free-standing polysaccharide nanosheet with the development of a nano-adhesive plaster. *Adv. Mater.* **2007**, *19*, 3549–3553.
2. Okamura, Y.; Kabata, K.; Kinoshita, M.; Saitoh, D.; Takeoka, S. Free-standing biodegradable poly(lactic acid) nanosheet for sealing operations in surgery. *Adv. Mater.* **2009**, *21*, 4388–4392.
3. Hatanaka, T.; Saito, T.; Fukushima, T.; Todo, H.; Sugibayashi, K.; Umehara, S.; Takeuchi, T.; Okamura, Y. Potential of biocompatible polymeric ultra-thin films, nanosheets, as topical and transdermal drug delivery devices. *Int. J. Pharm.* **2019**, *565*, 41–49.
4. Petersen, B.; Wulf, H.C. Application of sunscreen-theory and reality. *Photodermatol. Photoimmunol. Photomed.* **2014**, *30*, 96–101.