coatings

MDPI

Supplementary materials

Spectral Imaging of UV-Blocking Carbon Dot-Based Coatings for Food Packaging Applications

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1. Spectral Imaging techniques classification

There are two main categories of Spectral Imaging techniques:

- Multispectral imaging (MSI) systems which collect spectral cubes by dividing the spectral content in a small discrete set of bands. This approach typically relies on a finite set of bandpass filters and an imaging system that detects the 2D FOV at once on a 2D detector (widefield imaging): in this way an image is acquired for each spectral band [1].
- Hyperspectral imaging (HSI) systems which are able to separate the wavelengths in a continuous domain discretized only according to the number of detector elements or the postprocessing selected digital sampling. Typical HSI relies on the dispersive spectroscopy approach combined to spatial scanning systems. In whiskbroom methods the 2D FOV is sampled point-by-point (raster scanning) and each spectrum is detected by a dispersive spectrometer [2]. In pushbroom methods the spatial scanning is performed line-by-line: for each step the light is retrieved by a 2D detector where the line-spatial information and the spectral content are respectively distributed along the two dimensions of the pixels matrix [3].

2. Microscopy fluorescence imaging

Preliminary fluorescence microscopy images of spin-coated PLA and cellulose substrates were collected with a Nikon Eclipse TE2000-U (Tokyo, Japan) inverted confocal microscope by exciting with a 100 W Hg lamp with a 330–380 nm UV band-pass excitation filter (DM = 400 nm, BA = 420 nm) and a blue 450–490 nm band-pass excitation filter (DM = 505 nm, BA = 520 nm) (Figure S1). The difference in the intensity of the emitted light allows a raw discrimination on the sample surface of areas with circular shapes, which is morphologically consistent with the AFM/SEM results. However, the spectral information, mostly in the blue channel of the RGB camera, is insufficient to perform detailed analysis of the sample. To this aim, we performed the HSM measurements described in the main text.

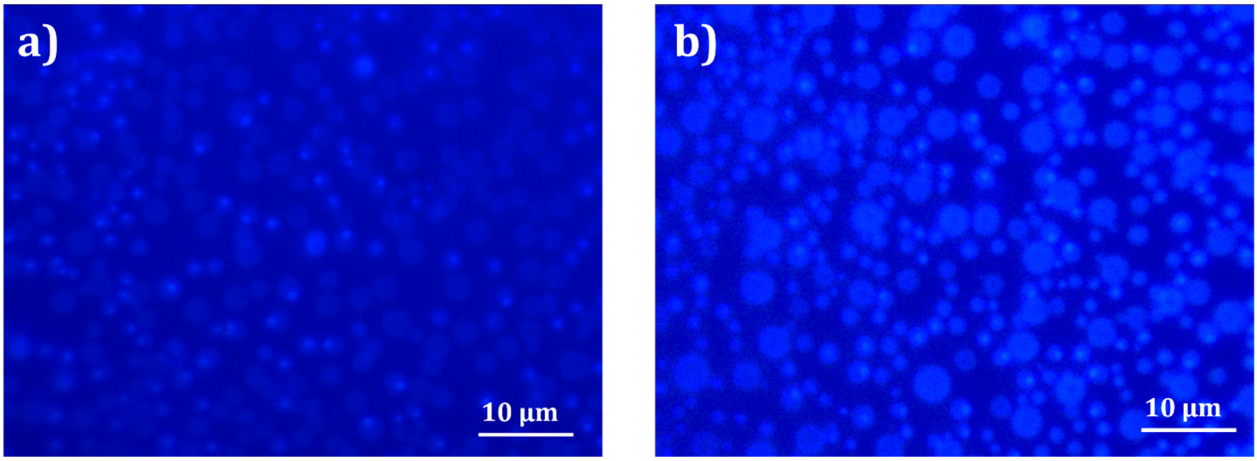

Figure S1. Fluorescence microscopy images of PVA:CDs-based spin-coated films on cellulose (**a**) and PLA (**b**) substrates.

References

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