

The near-IR Shielding Window composed of Tungsten Bronze Nanoparticles with Oleylamine as surfactant

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We provide the synthesis of quaternary tungsten bronze nano particles (QTBN) doped with sodium and cesium via a low-cost sol-gel process employing surfactants. The QTBN capped with oleylamine have an average diameter of nearly 30 nm and exhibited a shielding property of approximately 97% of near-infrared radiation in the a wavelength from 780 to 2100 nm, while transmitting 64 % of visible light at 432 nm upon dispersion in a non-polar solvent, toluene. We synthesis the double layer composed of the QTBN and acrylic binder which can be cured by UV. The QTBN and acrylic binder were coated by using the bar casting method. The better optical property of QTBN was confirmed in the double layer film compared to solution. We suggest the possibility that tungsten bronzes is available to apply many devices such as smart windows, mirrors, and eyewear due to their low power consumption and high energy efficiency.(This work was funded by the Ministry of Science,ICT and Future Planning(2014M2B2A4031389).)