Tin Oxide Nanoparticles Prepared via Laser Ablation in Liquid

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Recently, the laser ablation in liquid (LAL) has been recognized as a simple, convenient and "green" laboratory technique to prepare various nanomaterials. When using this approach, a laser beam is typically focused on a solid (often metal) target immersed in liquid medium, thus generating nanostructures with various morphologies, sizes, and chemistries (depending on laser parameters and nature of both the target and liquid used). Among other products, many semiconducting nanomaterials (e.g., metal oxides and sulfides) attractive for catalytic, gas-sensing and various photonic applications can be prepared using this method.

So far, however, there have been no reports on tin oxide nanostructures prepared by means of LAL. In this work, we applied two Nd:YAG lasers (with ms- and ns-long pulses and a wavelength of 1064 nm) to ablate Sn plates in water. The pulse width and laser power were changed to control the product properties. Figures 1 and 2 demonstrate TEM images and XPS spectra of nanostructures prepared with ns- and ms- pulsed lasers, demonstrating that the morphology and chemistry of products depended on laser pulse parameters applied for their generation.

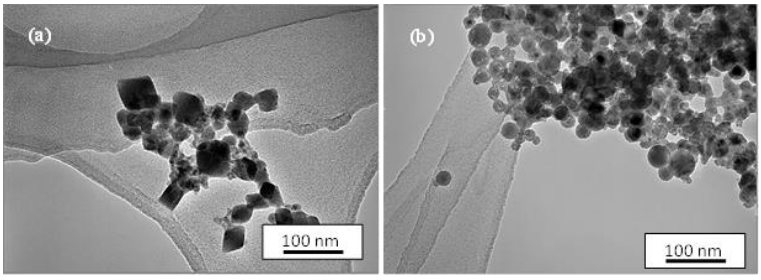

Fig. 1. TEM images of tin oxide nanostructures prepared by LAL with pulse width of (a) 7-9 ns and (b) 1.0 ms.

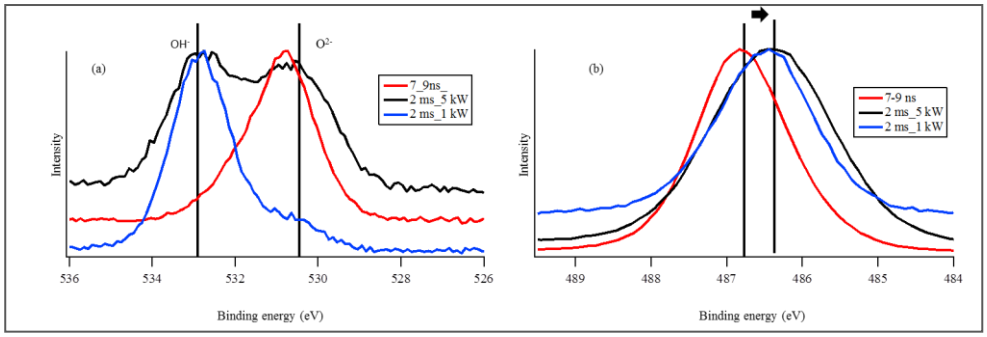

Fig. 2. XPS spectra of tin oxide nanostructures prepared with ns- and ms-long pulses: (a) O1s (b) Sn3d5 peaks.

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