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Supporting information for

Wavelength Dependent UV-Vis Photodetectors of SnS_2 Flakes

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Experimental detail

SnS_2 flakes were synthesized via CVD method. The chemical reaction was taken placed in a horizontal furnace incorporating a quart tube. SnO powder and S powder were used as reaction source. Firstly 0.0584g SnO powder (99.99% purity, Aldrich) was placed in a porcelain boat, and then positioned in the quarter part of the quart tube. A SiO_2/Si substrate was placed face down on the porcelain boat. S powder (99.99%, Aldrich) as sulfurization source was poured into a small quart vessel. The quart vessel with S powder was then placed in the center of the quart tube, close to the edge of the furnace. The distance between the quart vessel and the porcelain boat is about 15cm. the growth process was conducted in an argon environment. The flow rate of argon was large when the temperature was 120 °C firstly to get rid of H2O and other residual. Then the quartz tube was heated up to 860 °C at a rate of 40 °C/min., and meanwhile the flow rate was minimized to 10 sccm. S powder was melted when the furnace reached 700 °C. Then as soon as the furnace reached 860 °C the quartz tube was pushed in, placing the SnO powder at the center of the furnace, and the S was placed in the other end of the furnace. When the reaction is over, the quartz tube was pulled out and cooled down fast with spraying a mixture of water and alcohol on the hot tube, to low down the opportunity of oxidation and decomposition. When the furnace reached room temperature, the obtained product was taken out of the quartz tube. The whole process is depicted in Figure 1b.

Thin and flat SnS_2 flakes were obtained from the obtained product after sulfurization using micro-mechanically exfoliation with an adhesive Scotch tape, and then flat SnS_2 flakes were transferred onto a Si substrate with a 300 nm thick SiO_2 capping layer. Finally devices were characterized using optical microscopy (OM, Olympus BX51W1), atomic force microscopy (AFM, Veeco dimension Icon), Raman spectroscopy (Renishaw) and x-ray diffractometer (XRD, Bruker D8 Advance). Raman measurements were performed over an accumulation time of 10s with a 532 nm laser source, and spot size of the laser is 1um. XRD patterns were recorded on Bruker D8 Advance at a scanning rate of 2 °/min. using Cu Kα radiation (λ=1.5406 Å). Electrical and photo-response properties were measured using an optoelectronic testing system mainly including precision digital power supply (Agilent B2902A) and light source (Zolix LSP-X150).

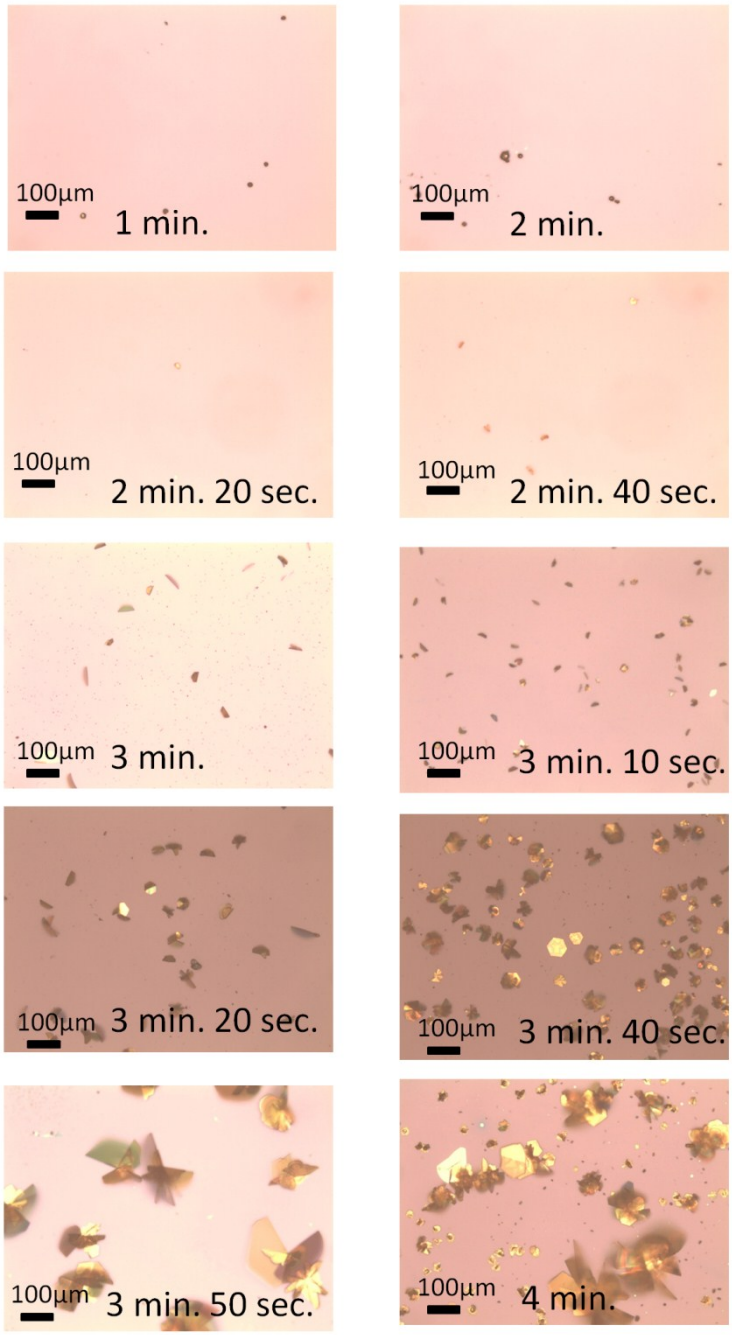

Figure S1. OM photographs of whole growth process with different time from 1 to 4 minute.