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Synthesis of tribological WS$_2$ powder from oxide precursor

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This paper describes two stages process for synthesis of WS$_2$ powder on selected temperatures by using WO$_3$ as a precursor. WO$_3$ submicron particles were prepared by ultrasonic spray pyrolysis of ammonium meta-tungstate (AMT) at 650°C in the air. WS$_2$ particles were obtained by sulfurization of the WO$_3$ particles in presence of additive K$_2$CO$_3$ in a nitrogen atmosphere, first at lower temperature (200°C) and followed by reduction at higher temperature (900°C). HSC Chemistry software package 9.0 is used for the analysis of chemistry and thermodynamic parameters of the processes for synthesis of WS$_2$ powder. The samples of WO$_3$ and WS$_2$ powders were characterized by X-ray diffraction (XRD) measurements. The morphology and composition of these samples were examined by scanning electron microscopy (SEM) combined with energy dispersive X-ray analysis (EDX).

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