Synthesis of MoO_3 belts by thermal evaporation method

Ngo Minh Chu[1*], Nguyen Duy Hieu[1], Thi Mai Dung Do[1], Tadachika Nakayama[1], Koichi Niihara[1], and Hisayuki Suematsu[1*]
[1]Extreme Energy-Density Research Institute, Nagaoka University of Technology, Nagaoka, Niigata 940-2188, Japan
*e-mail: suematsu@nagaokaut.ac.jp; ngominhchu@stn.nagaokaut.ac.jp

MoO_3 is one of the transition metal oxides, and its one dimension structure has been recognized to be a promising material for many applications including, catalysis, electronics devices, optical-display devices, chemical synthesis, and battery applications.[1,2] In this presented work, a large-scale of MoO_3 belts was synthesized at different temperatures from 800-1050 °C by using a tube furnace. MoO_3 belts were deposited inside the tube, on the surface of inner tube-wall. Figure 1 shows the XRD result with the highly aligned α-MoO_3 crystals (ICDD #000050508). The FE-SEM image of MoO_3 belts synthesized at 900°C is shown in Fig. 2. In comparing with previous studies,[3] this experiment is considered as a simple method to synthesize MoO_3 belts with a large amount. The belts were formed under a vapor- solid mechanism. At the first step, the MoO_3 at a temperature above 750°C was evaporated; by controlling the flowing gas in the furnace, the vapor moved to a lower temperature area then started deposited on the tube wall. At a fixed point on the tube, the MoO_3 belts were formed and collected. It is assumed that by varying the flowing gas and the temperature, the size and quantity of belts could be controlled.

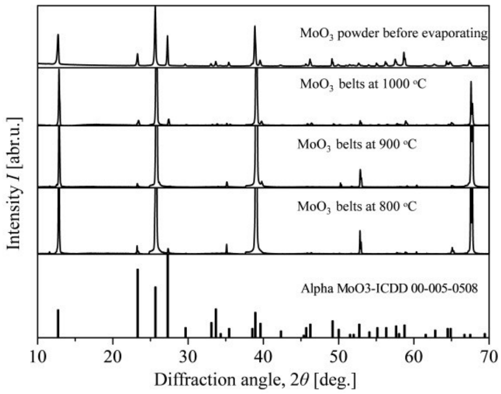

Fig. 1. The XRD patterns of MoO_3 belts at different temperatures.

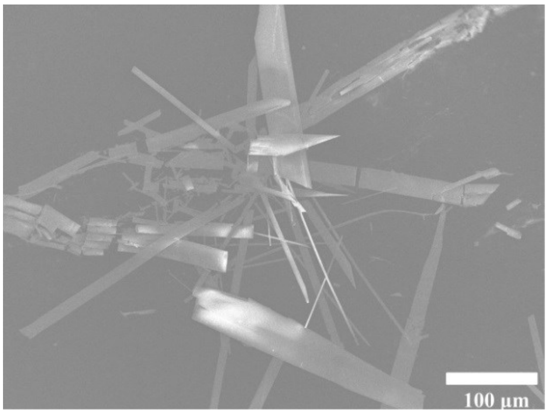

Fig. 2. The image of belts taken by FE-SEM of sample evaporated at 900 °C.

References

1. J. Li, P. Wei, J. Chen and L. Rongti: Journal of the American Ceramic Society. **85** (2004)2116.
2. T. Siciliano, A. Tepore, E. Filippo, G. Micocci and M. Tepore: Materials Chemistry and Physics. **114** [2](2009)687.
3. P. Badica: Crystal Growth & Design. 7 [4](2007)794.