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U. Hotje, R. Wartchow und M. Binnewies

Institut für Anorganische Chemie, Universität Hannover, Callinstr. 9, D-30167 Hannover

Sonderdruckanforderungen an Prof. Dr. M. Binnewies. E-mail: binn@mbox.aca.uni-hannover.de

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In the systems TiS_2/NbS_2, $TiSe_2/NbSe_2$, NbS_2/TaS_2 und $NbSe_2/TaSe_2$ complete miscibility in the solid state has been observed by powder X-ray investigations. Mixed crystals as well as the binary compounds can be prepared by chemical vapour transport reactions using iodine as transport agent in the temperature gradient 1000 → 900 °C. The gaseous species TiI_3(g), TiI_4(g), NbI_4(g) and TaI_4(g) are responsible for the transport effect.

Key words: Chemical Vapour Transport (CVT), Mixed Crystals of $Ti_{1-x}Nb_xS_2$, $Ti_{1-x}Nb_xSe_2$, $Nb_{1-x}Ta_xS$, $Nb_{1-x}Ta_xSe_2$