A New Layered Chalcogenide in the System NiIn$_2$S$_4$-NiIn$_2$Se$_4$

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The system (1 – x)NiIn$_2$S$_4$ - xNiIn$_2$Se$_4$ has been investigated by X-ray powder methods. The subsolidus phase diagram is constructed in the temperature interval 600 -1000 °C. The spinel type NiIn$_2$S$_4$ exhibits a phase width up to the composition NiIn$_2$S$_2$Se$_2$ at 900 °C and NiIn$_2$S$_{2.8}$Se$_{1.2}$ at 600 °C. A new layered compound is formed for 0.7 ≥ x ≥ 0.5 at 600 °C and for x = 0.6 at 900 °C which crystallizes in the MgAl$_2$S$_4$-type with a = 392.4 and c = 3739.6 pm (x = 0.6) for the hexagonal cell.