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N-TIPLI VISMUT TELLURIDI VA SELENID QOTISHMALARI

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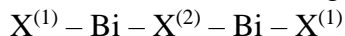
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Annotatsiya: n-tipli materiallar uchun vismut telluridi va vismut selenidning termoe.yu.k. koeffitsienti va elektr o'tkazuvchanligi sezilarli darajada farq qilishi mumkinligi sabab, qotishma tarkibi kata ahamiytga ega hisoblanadi. n-tipli vismut telluridi va vismut selenid qotishmasi termoelektrik parametrlari p-tipli materiallar kabi emas. Bunga sabab, qotishma tarkibi murakkab kristall panjaraga ega ekanligi va undagi issiqlik o'tkazuvchanligidir.

Vismut telluridi o'zining issiqlik o'tkazuvchanligi pastligi tufayli xona haroratida qo'llanilishi uchun asosiy termoelektrik materialdir [1].

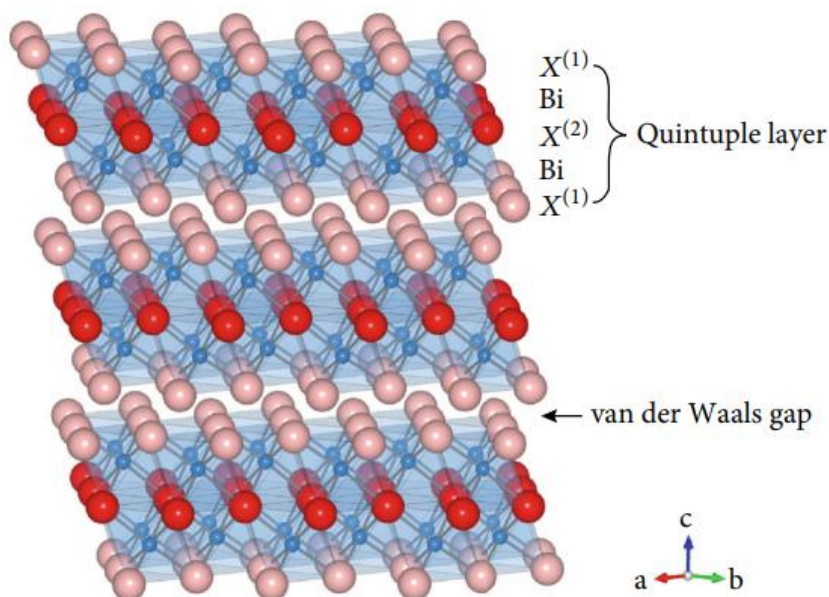
$\text{Bi}_2\text{Te}_{3-x}\text{Se}_x$ kristall strukturasi $\text{X}^{(1)} - \text{Bi} - \text{X}^{(2)} - \text{Bi} - \text{X}^{(1)}$ ning beshta qatlamlaridan iborat bo'lib, bunda X Te yoki Se ni ifodalaydi va qavs ichidagi son ikki vismut orasidagi belgini bildiradi. $\text{X}^{(2)}$ o'rmini Se egallaydi va qotishma $\text{Bi}_2\text{Te}_2\text{Se}$ tarkibida tartiblangan birikma hosil qiladi.

Vismut telluridi, vismut selenidi tetradimit kristalli tuzilishga ega.



Bu yerda qavs ichidagi raqam ikkita xalkogen (X) joylarini bildiradi. $\text{X}^{(1)}$ halkogen atomlari uchta Bi atomi bilan kovalent bog'langan va boshqa uchta $\text{X}^{(1)}$ atomlari bilan zaifroq Van der Waals kuchlari bilan bog'langan. Vismut atomlari halkogen atomlari tomonidan oktaedral, $\text{X}^{(2)}$ atomlari esa Bi tomonidan oktaedraldir.

Bi- $\text{X}^{(1)}$ bog'lanish kovalent bog'lanish, Bi- $\text{X}^{(2)}$ bog'lanish esa ionli bog'langan. Har bir xalkogenning bog'lanishdagi farqi kristall panjaraning elektr va issiqlik xususiyatlariga sezilarli ta'sir ko'rsatadi.



1-rasm. $\text{Bi}_2\text{Te}_2\text{Se}$ kristall tuzilishi.

Bu o'ziga hoslik Bi_2Te_3 da tartibga solingan birikma hosil bo'lishiga olib keladi, u qotishma paytida xalkogen joyi o'zgaradigan chegara nuqtasi bo'lib xizmat qiladi.

$\text{Bi}_2\text{Te}_2\text{Se}$ kristall tuzilishi olimlarimiz tomonidan juda ko'p o'rganilgan. Lekin, 300°C ga yaqin haroratlarda faza $x = 0,5$ va $x = 1,4$ ga yaqin birikmalarga ega bo'lgan ikkita birikmaga bo'linadi.

n-tipli $\text{Bi}_2\text{Te}_{3-x}\text{Se}_x$ qotishma tizimini shundan ham murakkab kristall tuzilishga ega ekanligini bilish mumkin.

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KRISTALLCHALAR O'LCHAMINING TAGLIK HARORATIGA BOG'LIQLIGINI O'RGANISH

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