## Transport property of compensated topological insulator, $Bi_2Se_3$

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Basic transport properties of compensated $Bi_2Se_3$ single crystals are present.
$Bi_2Se_3$ usually shows bulk metallic behavior with $n$-type carrier because Se vacancies act as the dominant. In order to observe the transport properties dominated by the topological surface states, compensated samples are needed.
We synthesized low $n$- and $p$- type single crystals ($n_e$, $n_p \sim 10^{17-19}$ cm$^{-3}$) using Mg and Ca as foreign dopants, and also prepared doping-free $n$ -type samples ($n_e \sim 10^{17}$ cm$^{-3}$) with a nominal molar composition ratio of 1:2 (=Bi:Se) in the preparation process.
Almost all prepared samples showed metallic behavior down to low temperatures. One $p$-type Ca-doped sample had insulating behavior below 150 K although the carrier number reached almost $10^{19}$ cm$^{-3}$. Clear SdH oscillations were observed in all samples except Ca-doped ones. These results indicate that kinds of dopants affect the transport properties of the compensated samples.
We report elementary transport properties, such as resistivity, Hall coefficeint, and Seebeck coefficient, of compensated samples and discuss what dopants are suitable for the best compensation of $Bi_2Se_3$.
We also discuss superconductivity in Cu-intercalated $Bi_2Se_3$.