

# Stability of 2D Alkaline-Earth Metal Silicides, Germanides and Stannides

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**Abstract:** By means of ab initio calculations, we have estimated stability of 2D  $\text{Me}_2\text{X}$  ( $\text{Me} = \text{Mg}, \text{Ca}, \text{Sr}, \text{Ba}$  and  $\text{X} = \text{Si}, \text{Ge}, \text{Sn}$ ) in the T

and Td phases, which are similar to the ones of 2D transition metal chalcogenides, in addition to their phonon spectra. The T phase is found to be more stable for 2D  $\text{Ca}_2\text{X}$ ,  $\text{Sr}_2\text{X}$  and  $\text{Ba}_2\text{X}$ , whereas the Td phase is predicted to be the ground state for 2D  $\text{Mg}_2\text{X}$ . We have also discussed that imaginary frequencies in the calculated phonon spectra of 2D  $\text{Me}_2\text{X}$ , which appeared in the vicinity of the  $\Gamma$  point, were not necessarily associated with the dynamic instability.

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