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Silicene, germanene and tinene: Modeling of IR absorbance and topological states FRIEDHELM BECHSTEDT, LARS MATTHES, Friedrich-Schiller-Universitaet Jena, OLIVIA PULCI, University Rome II Italy, PAOLA GORI, University Rome III Italy, BECHSTEDT/MATTHES TEAM, PULCI/GORI TEAM — The graphene-like but Si-, Ge- or Sn-derived group-IV honeycomb crystals [1] have attracted much attention due to their unique properties and their recent realization in experiments [2]. We study their electronic and optical properties by means of ab initio electronic-structure calculations. Conical valence and conduction bands and a vanishing electronic band gap have enormous consequences. Independent of the group-IV element and the degree of hybridization a universal absorbance ruled by the Sommerfeld finestructure constant appears [3,4]. This result is however influenced by spin-orbit coupling, which also plays an important role for germanene and tinene nanoribbons. Topological metallic edge states appear, if the edges are non-magnetic [5].

[1] L. Matthes et al., J. Phys. CM 25, 395305 (2013)
[2] P. Vogt et al., PRL 108, 155501 (2012)
[3] F. Bechstedt et al., APL 100, 261906 (2012)
[4] L. Matthes et al., PRB 87, 035438 (2013); New J. Phys. 16, 105007 (2014)
[5] L. Matthes, F. Bechstedt, PRB 90, 165431 (2014)

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