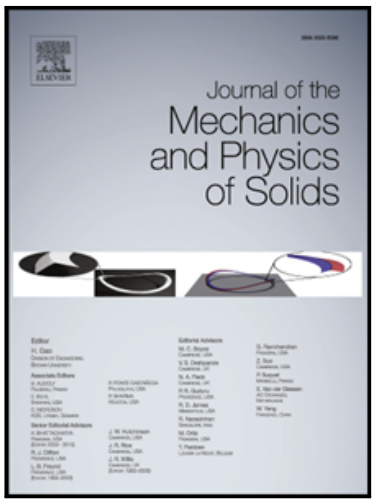

An Existence Criterion for Low-Dimensional Materials

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Highlights

- An atomistic-based energy stability criterion for low-dimensional materials is established.
- The criterion is expressed by the inequalities for several derivatives of interatomic potential.
- Parameter-based phase diagrams are established to show the existence of straight/planar low-D equal-bond-length elemental materials.
- This approach explains the stable existence of graphene, silicene and germanene.