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Alignment Energy and Graphene Sliding (Mining article)

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Abstract: *The alignment energy of graphite clusters coincides with the excitation energy for shuffling the graphene plates.*

Keywords: *Alignment energy, graphene sliding*

1. Introduction

Graphite two-dimensional basal plates (graphene) are held together by weak van der Waals bonding as presented in Figure 1 [1].

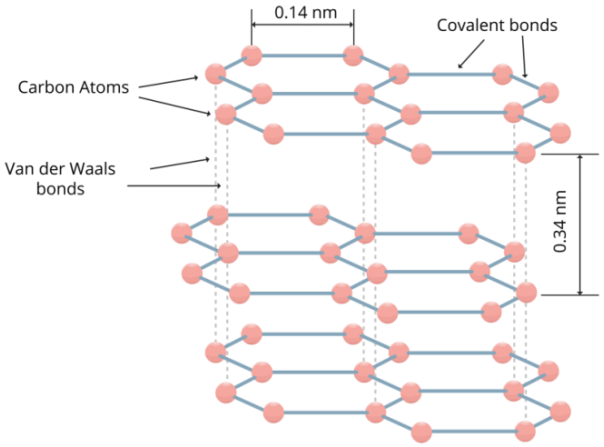

Figure1. *Graphite structure [1]*

The activation energy for shuffling these plates is 0.076 eV, much less than 2% of the energy required to break a graphite bond (4.8 eV) [2]. This activation energy is easily overcome at a temperature of 882 K. Let's see how this finding coincides with the alignment energy [3] of carbon clusters made of hexagonal rings. The alignment energy enables to express the graphite cluster identity and can be interrupted by sliding movement of the parallel graphene plates.

2. Clusters of Hexagonal Carbon Rings Characterised by Alignment Energy of about 0.076 eV

15 such clusters exist. Their alignment energy and temperature equivalent were calculated following the alignment energy concept [3] and are collected in Table 1.

Table1. *Carbon clusters characterised by the alignment energy of about 0.076 eV and temperature equivalent 882 K*

	Number of C atoms	Alignment energy (eV)	Temperature equivalent (K)
1th	12	0,07596300	881,5141
2th	24	0,07597254	881,6247
3th	36	0,07597431	881,6452
4th	**48**	**0,07597492**	**881,6524**
5th	60	0,07597521	881,6557
6th	72	0,07597536	881,6575
7th	84	0,07597546	881,6586

8th	96	0,07597552	881,6593
9th	108	0,07597556	881,6598
10th	120	0,07597559	881,6601
11th	132	0,07597561	881,6604
12th	144	0,07597563	881,6606
13th	156	0,07597564	881,6607
14th	168	0,07597565	881,6608
15th	180	0,07597566	881,6609

The fourth cluster from Table 1 is made of 48 carbon atoms and its structure is presented in Figure 1. It is graphite consisted of three graphene plates each possessing four hexagonal rings with six common vertices. The alignment energy of 0.076 eV could hold the graphene plates together and prevent them sliding; but just a little greater opposing excitation energy could enable sliding.

3. INSTEAD OF CONCLUSION

Sliding can be a loss as well as finding the identity

DEDICATION

To my dear sister Darinka Springer – the poet, born 20.02.1948 – and turning graphite to diamond

Figure2. *Graphite and diamond [4]*

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