

Similar to the "magic angle formula" of graphene magic angle

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Abstract: By speculating the magic angle of graphene, we can guess the magic angle formula of other crystals.

Key words: Graphene, crystal, magic angle formula.

I may have accidentally got a magic angle formula similar to graphene crystals. But I can't do the experiment, dear professor. Would you like to try to verify it? For cubic, hexagonal, tetragonal and trigonal systems.

The formula is: (the edge length of the unit cell c) / [(the edge length of the unit cell a) * (the distance between the layers of $c \sin(\theta)$) * (10⁻¹²)] = sin (rotation angle), the unit is pm.

In a typical layered structure, carbon atoms are arranged in layers, and each carbon is equidistant to the adjacent carbon, and the carbon in each layer is arranged in a Because the structures of cubic, hexagonal, tetragonal and trigonal systems are similar, I guess they all have the same formula. Other crystal systems do not dare to guess because they do not see similar phenomena.

Why do I guess this? because I guess the reason for this magic horn phenomenon in graphene is

$$\frac{670}{246 * 142 * \sin(1.1^\circ)} = 1$$

Crystal system and space group of graphene: hexagonal system, P63/mmm. The unit cell parameters of graphene are as follows: a 246pm, c 670pm.

hexagonal ring. The carbon hexagonal rings of the upper and lower adjacent layers are shifted to each other through the direction of the parallel network, and then superimposed to form a layered structure. Different azimuth and distance of displacement lead to different polymorphic structures.

The distance between the carbon atoms of the upper and lower layers is much larger than that of the carbon in the same layer (intra-layer C_{intra} distance = 142pm, interlayer C_{inter} distance = 340pm).

If you are not sure, you can start with crystals similar to graphene crystals.

Reference: none.