

Electronic properties of C_{60} crystals: why we need crystals grown in a microgravity?

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The crystalline fullerene C_{60} is a novel semiconductor very interesting for basic science and for possible applications. It corresponds to intermediate case between «classical» semiconductors (like Si or GaAs) and «classical» molecular crystals. Therefore, some interesting effects related to insulator–metal transitions and electron correlation can be possibly discovered in C_{60} crystals. In spite of numerous investigations, the electronic properties of C_{60} crystals are still far from clear understanding. It is even not clear to what extent it is possible to consider the solid C_{60} as one-electron band-like semiconductor. The main reason for that is the very high defect concentration in the crystals available now.

In the present report we discuss some experimental data concerning the electronic properties of C_{60} crystals and the existing problems in their interpretation. We also discuss the reasons why the crystals grown in normal gravitation have many defects and why there is a good chance to produce much more perfect crystals in a microgravity conditions.