Comment on "Understanding the Epitaxial Growth of Se_xTe_y@Te Core−Shell Nanorods and the Generation of Periodic Defects"

In their recent paper, Moon *et al.*[1] reported a solution-based synthesis of Se_xTe_y nanorods and their subsequent epitaxial coating with Te shells. Transmission electron microscopy (TEM) study of these core−shell nanorods revealed periodic contrast oscillations (the term "periodic dark stripes" was used in the paper), which were misidentified by the authors as self-regulated periodic defects formed due to stress relaxation during cooling. They overlooked that these contrast oscillations exhibit all characteristics of a typical Moiré pattern, a well-known phenomenon encountered not only in TEM and other microscopic techniques, but also in optics, surface science, several other fields of physics, and even everyday life.[2] In TEM, such patterns can be observed when two overlapping crystals with nearly equal interplanar spacing and adequate mutual orientation are imaged.[3] As expected for Moiré patterns, TEM images of Se_xTe_y@Te nanorods show contrast oscillations in the core part only, that is, in the area where the Te shell and the Se_xTe_y core are superimposed. It is also known that Moiré patterns enhance the visibility of dislocations.[4] This phenomenon can be clearly seen in some of the TEM images shown in the paper. For instance, a few dislocations, seen as discontinuities of a Moiré pattern, can be observed in Figure 5B. These dislocations (and not, as the authors claim, the dark fringes) might indeed have been formed due to stress relaxation during cooling; however, they are not periodic. The paper does not include any diffraction data. Thus, analysis of the pattern becomes questionable. However, the assumption that it consists of a pure translational component originating from the (003) planes, that is, from the planes with interplanar spacing of 1.81 Å and 1.97 Å for the Se_xTe_y core and Te shell, respectively, leads to the Moiré spacing of 2.23 nm, which is in good agreement with the 2.42 $\pm$ 0.15 nm value measured by the authors. This in turn, reinforces the identification of contrast oscillations as being a typical Moiré phenomenon.

REFERENCES AND NOTES

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