Collisions of a Buckyball with Graphene and SiC Sheets at Supersonic Speeds

Liu, Emily (School: Loudoun County High School)

Collisions of a buckyball at various supersonic initial speeds with a single-layer graphene sheet, double-layer graphene, and single-layer SiC sheet were studied using quantum mechanics-based molecular dynamics computer simulations. The effect of the initial speed of the buckyball on the collision was studied in terms of the damage to the buckyball, damage to the sheet, translational and vibrational motion of the buckyball, chemical bonding between the buckyball and the sheet, etc. It was found that these collisions can be classified into several categories based on these factors, ranging from low-speed collisions that result in an undamaged buckyball bouncing off an undamaged sheet to high-speed collisions that result in fragmentation of the buckyball and permanent damage to the sheet. Additionally, it was found that collisions of a supersonic buckyball with a SiC sheet at speeds of 1 km/s or 3 km/s may cause the buckyball to retain a negative charge even after it bounces off the sheet.

Awards Won:

Third Award of $1,000