PO1061

Novel Combination of Raman Peak Assigments in Study of Annealing Effects in a-C:H, and Resulting Substructures

Stephane NEUVILLE[1]

[1]TCE, CUISY, France

stephane.neuville709@orange.fr

Raman spectroscopy has shown since a long time that the atomic rearrangement of hard carbon coating materials during an annealing process can be more complex than usually admitted. The observed evolutions of the "D" peak shape, had not been totally understood up to now, despite important progresses achieved on Raman peak assignments. It is also known that the annealing process can present severe drawbacks at higher annealing temperature and longer processing time, for which the DLC material will be degraded to softer and more graphitic materials. Therefore, it appears to be important to better know which sort of annealing effects actually exist in order to be able to optimize the annealing process, when considering the high number of different possible annealing means and parameter combinations which can affect the coating material properties and its internal stress. The often observed increase of a sharp D peak during the annealing process is not in accordance with presently existing interpretation models. Using a more differentiated Raman spectroscopy analysis, we suggest the existence of two antinomic atomic rearrangement types during the annealing process, overcoming the apparent former contradictions. The first one corresponds to the well known graphitic degradation process where the sp2 clusters are growing. The second one suggests an atomic rearrangement in the shrinking sp3 matrix to better diamond like structure in the sp2 cluster boundaries, before totally disappearing, in total agreement with other previously identified atomic rearrangement effects, different from the ion impact and compression effects. What will be discussed in more details in a separate presentation.

Keywords
DLC
Raman
DLC
ta-C
sp2 clusters