Graphene growth directly on functional substrate

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Figures

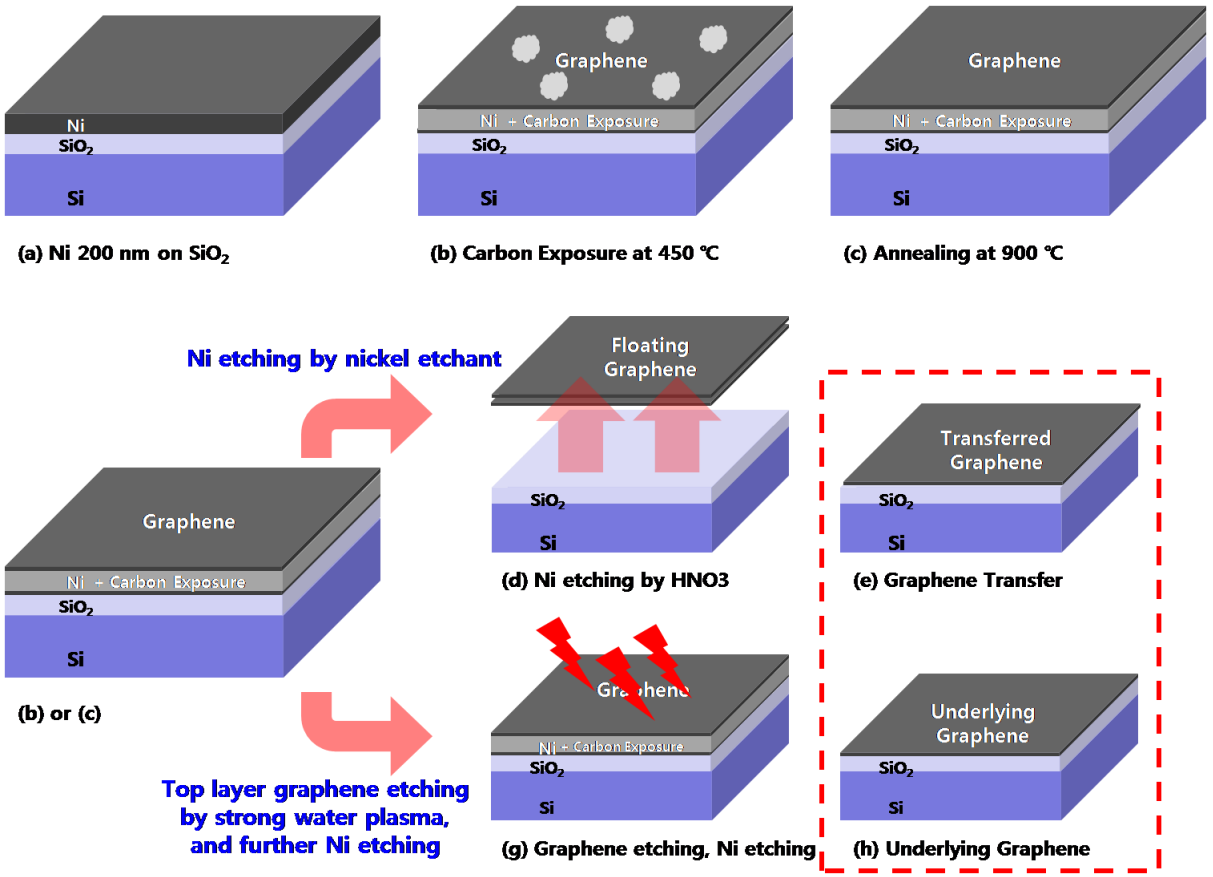

Figure 1. General process for plasma-assisted graphene growth

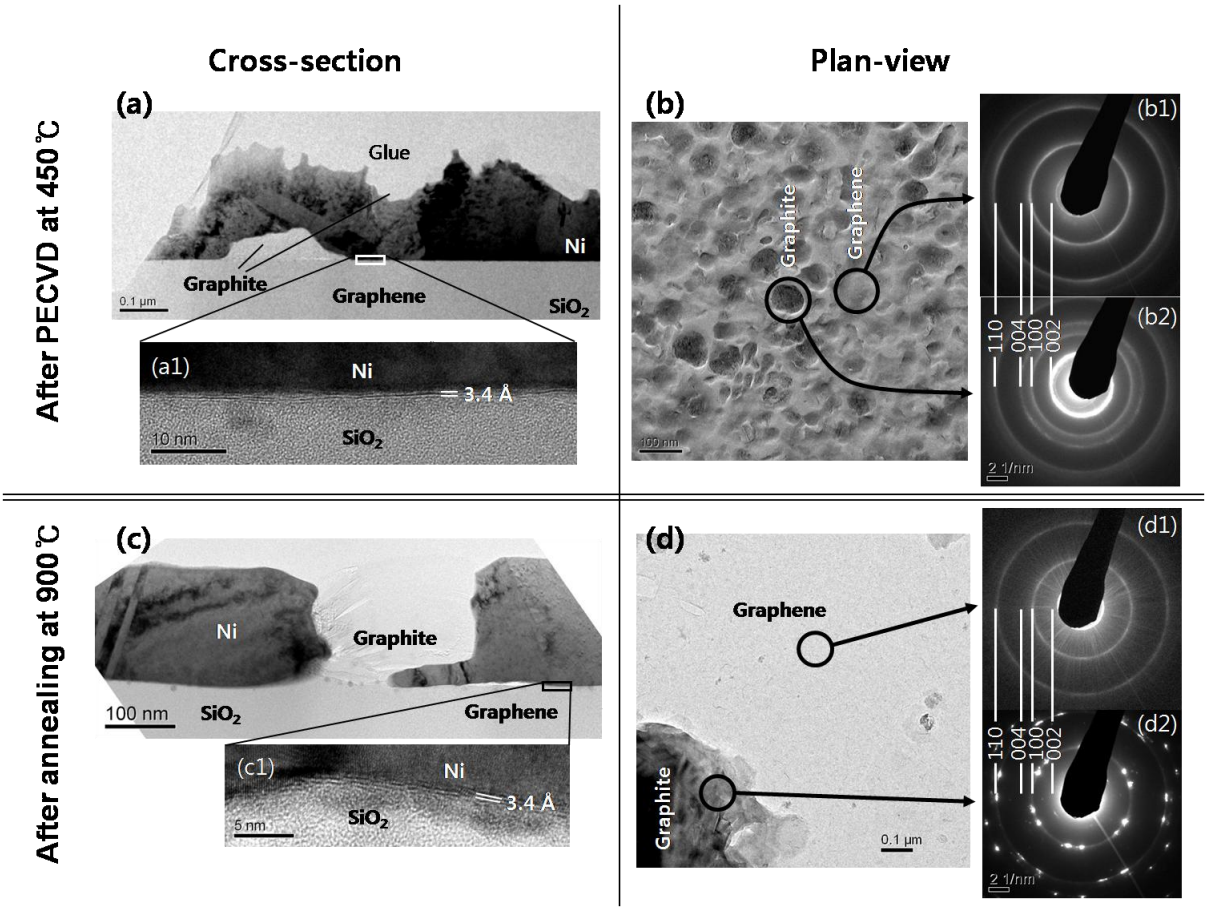

Figure 2. TEM images of the samples after growth by PE-CVD at 450°C for 12 min (a,b), and after an additonal annealing treatment in vacuum at 900°C for 18 min (c,d). (a, c) cross-sections where graphite blocks can be seen, together with interfacial graphene in the two cases. The latter (a1, c1) appears continuous over several tens of nm, and more so before annealing. (b, d) plan-views obtained after Ni etching, and depositing the remaining layer on a TEM holey-carbon grid. Images recorded in holey regions (no contribution of amorphous carbon). The diffraction paterns (b1 and d1) indicate that the background consists of nano-crystalline graphene, with random orientation of the nano-grains in the plane (see fig. 3). Note the absence of 002 and 004 reflections indicating a good alignment of the graphene layers in the plane. The graphite blocks are small pilars or onions, with (002) planes parallel to the beam before anealing (b2), while they are flat with no (002) planes visible after annealing (d2).

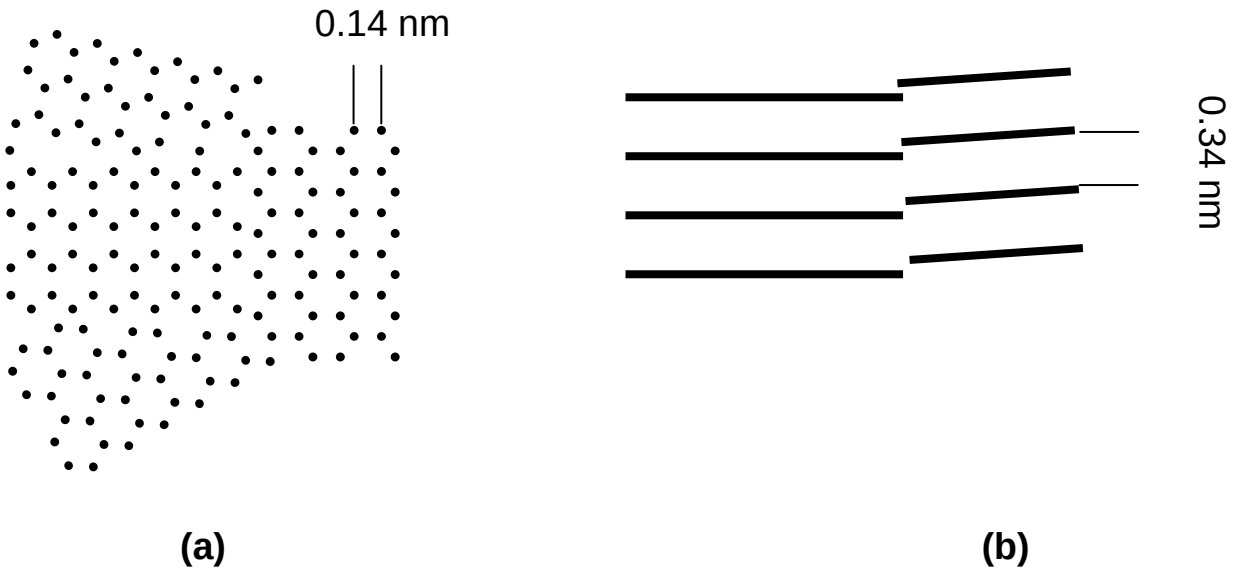

Figure 3. Schematic of the graphene structure in the plane (a) and perpendicular to the plane (b). Atomic positions in (a) are given for visualising the in-plane misorientation of four nm-sized grains; they do not represent, of course, actual positions.

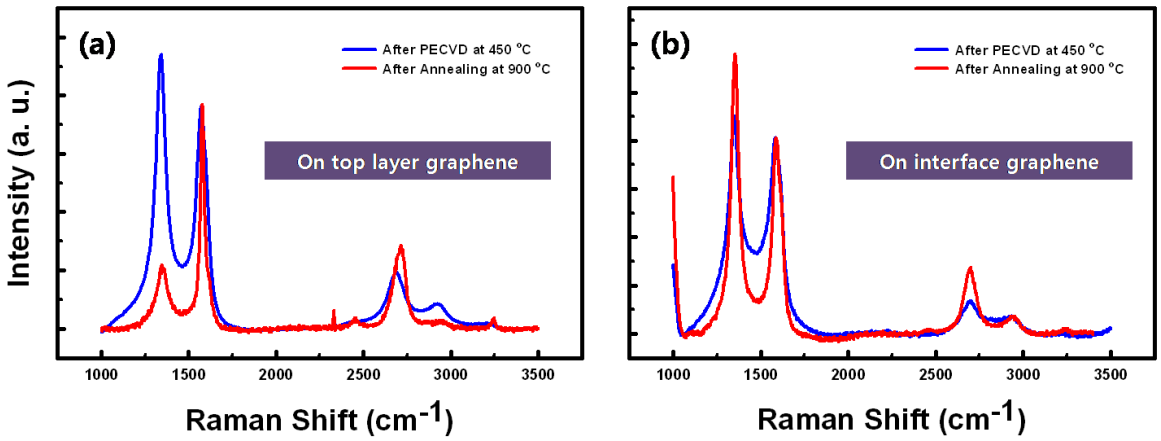

Figure 4. The chang of raman spectra after PECVD(blue color) and after Annaling(red color) on (a) top layer graphene, (b) interface graphene, respectively..jpg

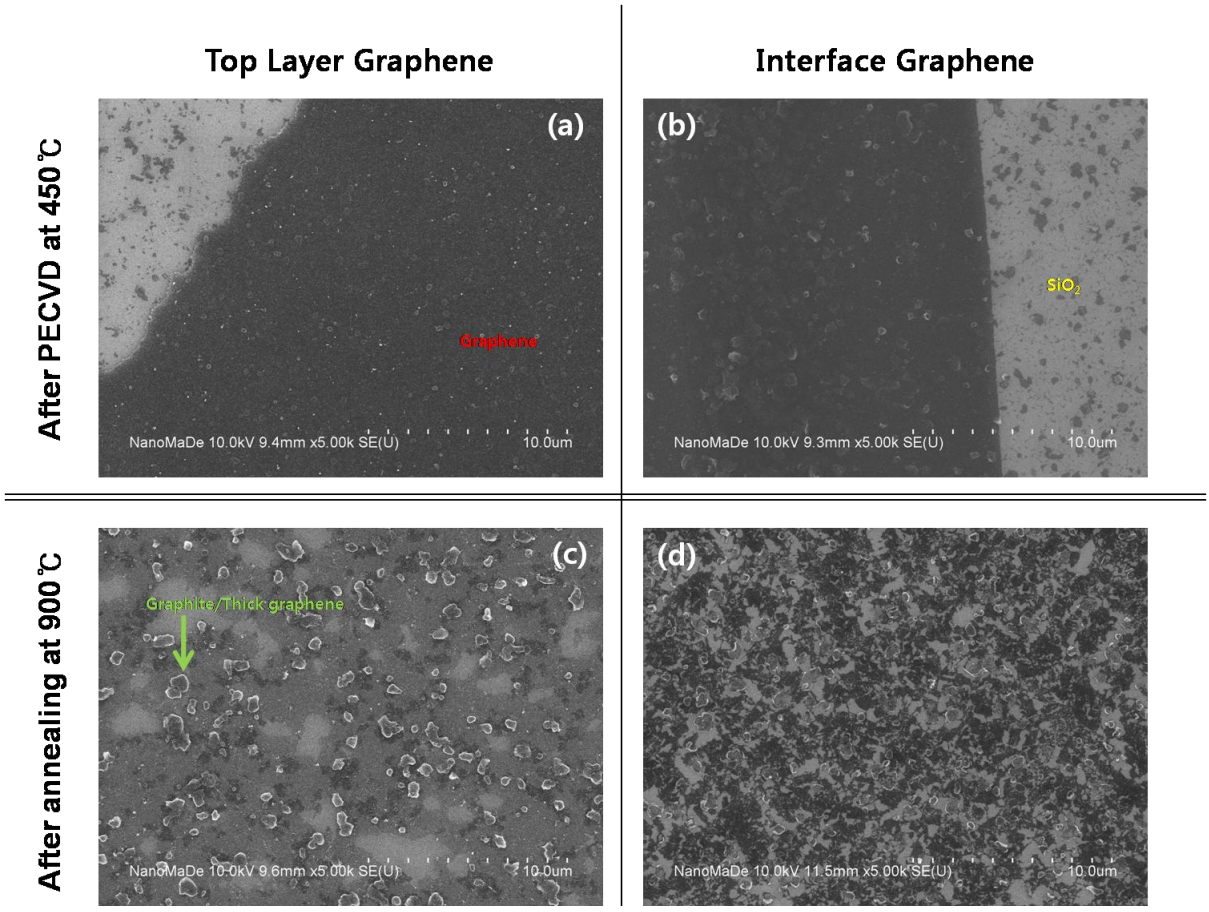

Figure 5. SEM images