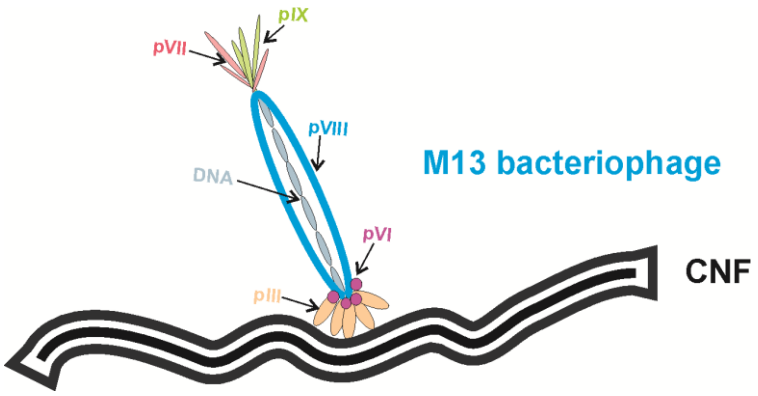

Fig. 1 Schematic illustration of carbon nanofibres (CNF) binding by the pVII protein with point mutation of the bacteriophage M13.

Table 1. Comparison of changed region of pVII (nucleotide and amino acid sequences) of the unmodified phage (pVII-M13) and modified phage with point mutation (pVII-mutant-M13).

Phage name	Nucleotide sequence of the *pVII* gene of M13 bacteriophage (residue 1142 is marked)	Amino acid sequence of the pVII protein of M13 bacteriophage (residue 381 is marked)
pVII-M13	...ACA ATT TAT CAG GCG ATG ATA...	...TIYQAMI...
pVII-mutant-M13	...ACA ATT TAT CGG GCG ATG ATA...	... TIYRAMI...

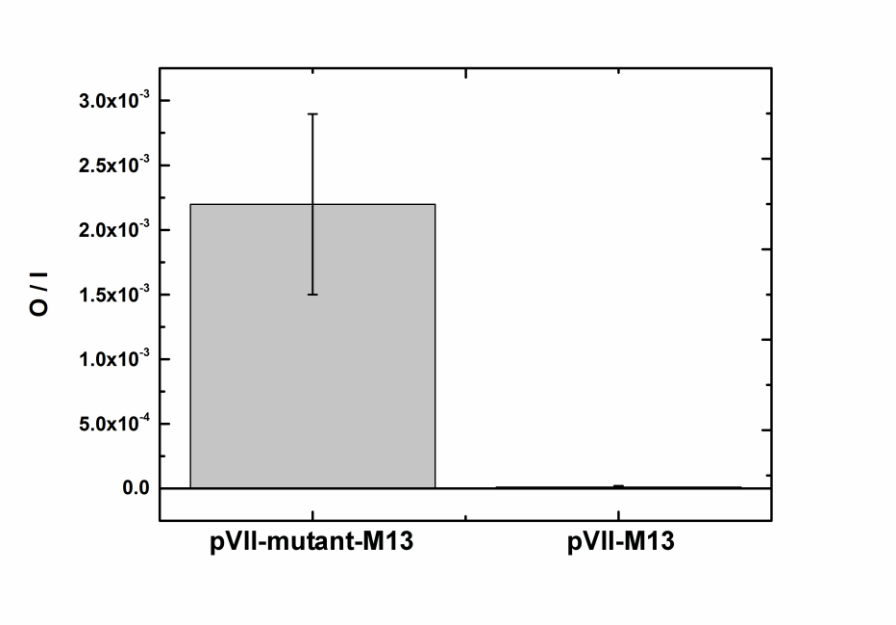

Fig. 2. Efficiency of CNF binding (O/I) by the phage (pVII-mutant-M13) with point mutation on the pVII protein and by the unmodified phage (pVII-M13). The presented results are average values from four experiments with RSD represented by *error bars*.

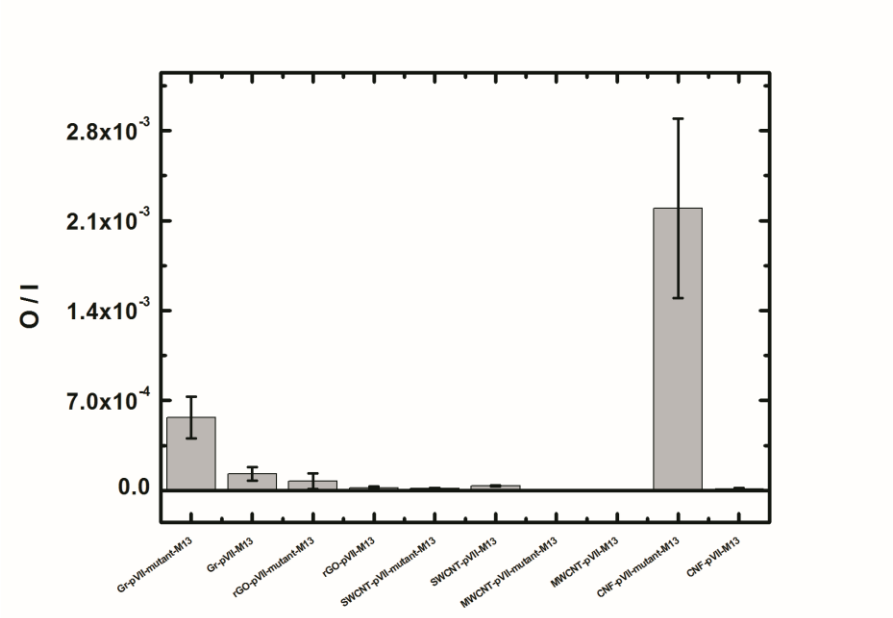

Fig. 3 . Efficiency of used carbon nanomaterials binding (O/I) by the phage (pVII-mutant-M13) with point mutation on the pVII protein: (Gr-pVII-mutant-M13) graphite, (rGO-pVII-mutant-M13) reduced graphene oxide, (SWCNT-pVII-mutant-M13) single-walled carbon nanotubes, (MWCNT-pVII-mutant-M13) multi-walled carbon nanotubes and with unmodified protein pVII-M13 (Gr-pVII-M13, rGO-pVII-M13, SWCNT-pVII-M13, MWCNT -pVII-M13) in comparison with binding efficiency calculated for binding CNF with modified protein pVII (CNF-pVII-mutant-M13) and unmodified protein pVII (CNF-pVII-M13) M13 bacteriophage. The presented results are average values from four experiments with RSD represented by *error bars*.

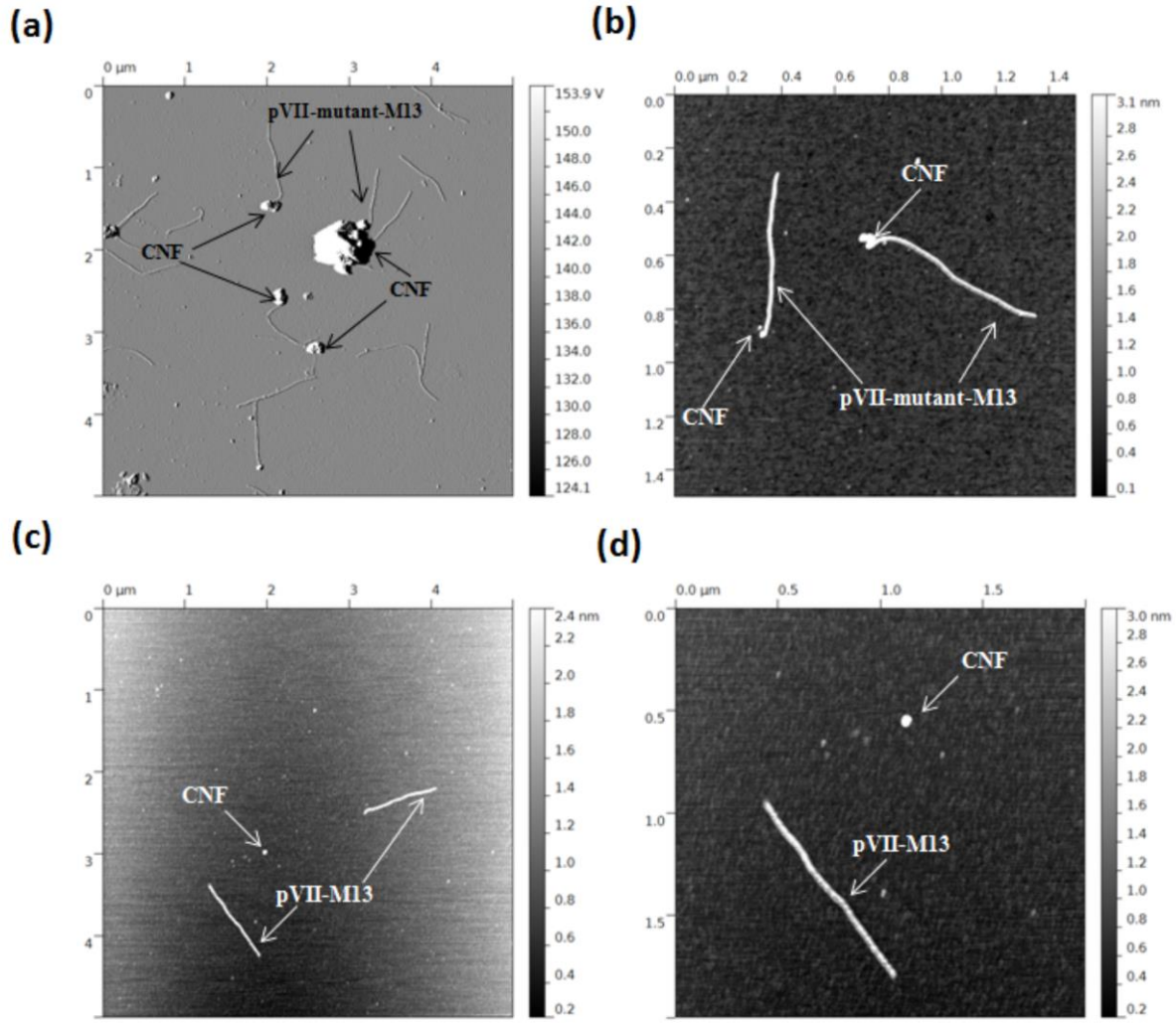

Fig. 4 AFM images of CNF (a, b) specifically bound to the modified protein of the pVII-mutant-M13 and (c, d) unbound with the unmodified protein of the pVII-M13 (c,d). AFM (a) amplitude error and (b-d) topographic images.

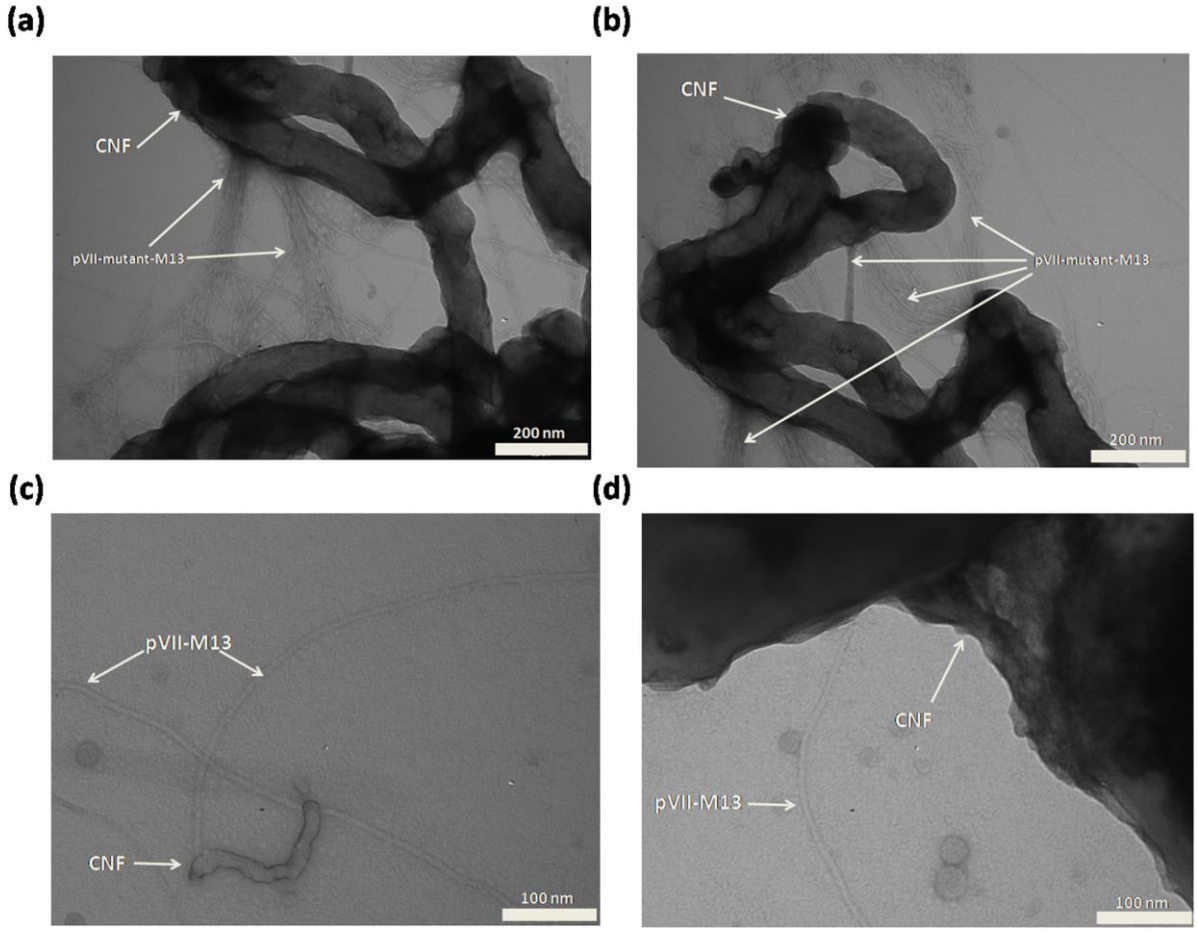

Fig. 5 TEM images of CNF (a, b) specifically bound with the pVII-mutant-M13 and (c, d) with the unmodified pVII-M13 bacteriophages visibly unbound.

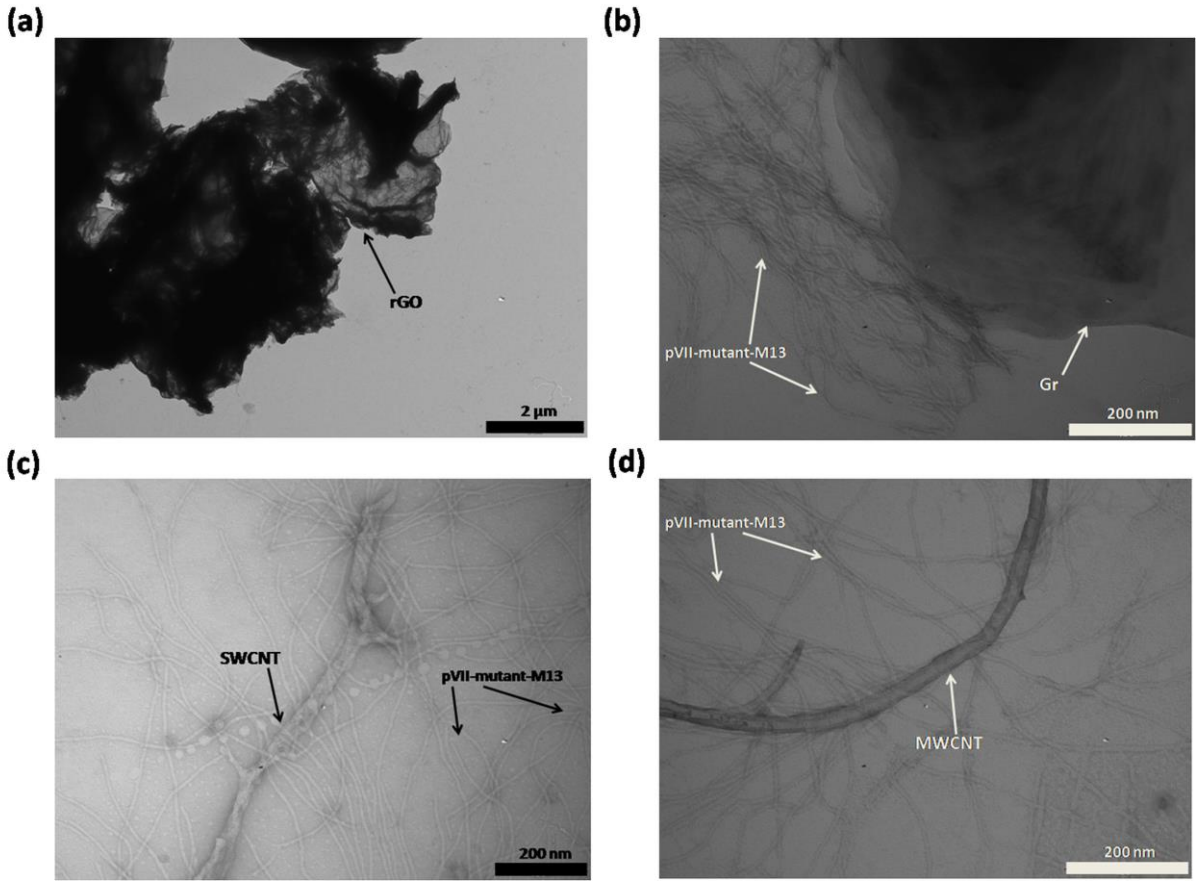

Fig. 6 TEM images of carbon nanomaterials (a) graphite (Gr), (b) reduced graphene oxide (rGO), (c) single-walled carbon nanotubes (SWCNTs), (d) multi-walled carbon nanotubes (MWCNTs) and their interactions with the pVII-mutant-M13 phages.