Supporting Information

Carbon nanotube triaxial woven films with high mechanical property for impacting protection

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Imput code of bilayer films impacting simulation for MD simulation.

```
units            metal
dimension        3
atom_style       full
boundary         s s s
atom_modify      map yes
read_data        san7.0ro0.data
read_data        plaindata add append
mass             * 12.017
pair_style       airebo 3.0 1 1
pair_coeff       * * CH.airebo C
timestep         0.001
thermo_style     custom step temp pe ke epair etotal press pxx pyy pzz vol lx ly lz
thermo           100
neighbor         2.0 nsq
neigh_modify     every 1 delay 0 check yes
compute          ke all ke/atom
compute          s all stress/atom NULL virial
compute          peratom all pe/atom
variable         mises atom "0.707106781 * sqrt( (c_s[1] - c_s[2])^2 + (c_s[2] -
c_s[3])^2 + (c_s[1] - c_s[3])^2 + 6*(c_s[4]^2 + c_s[5]^2 + c_s[6]^2) )"
velocity         all create 10 4928459 sum no dist gaussian loop local
velocity         all zero linear
dump       1 all custom 10000 mini.*.lammpstrj id type x y z
min_style  cg
minimize   0 0 1000000 10000000
fix        1 all nve
fix        2 all temp/berendsen 1.0 1.0 0.5
run        10000
```

```
undump     1
unfix      1
unfix      2
write_restart      minimize*.restart
region     left      block INF INF INF 150 INF INF
region     stre      block INF INF 1400 INF INF INF
region     up        block INF INF INF INF 150 INF
region     bottom    block INF INF INF INF INF 1400
group      up        region up
group      bottom    region bottom
group      left      region left
group      stre      region stre
fix        6 up setforce 0 NULL 0
velocity      up set 0.0 NULL 0.0 units box
fix        7 bottom setforce 0 NULL 0
velocity      bottom set 0.0 NULL 0.0 units box


fix        4 left setforce 0 0 0
velocity      left set 0.0 0.0 0.0 units box
fix        8 stre setforce 0 NULL 0
velocity      stre set 0.0 NULL 0.0 units box
variable        stre1 equal -pyy
variable        stressy equal v_stre1*lx*lz/(PI*6.7*3.4*10000*4*sin(PI*60/180))
variable        1 equal xcm(stre,y)
variable        3 equal xcm(left,y)
variable       initial_y equal v_1-v_3
variable       iniy equal ${initial_y}
variable       strainy equal (v_1-v_3-v_iniy)/v_iniy
fix       1 all nve
fix       2 all temp/berendsen 1.0 1.0 0.5
fix       3 all ave/time 1 100 1000 v_strainy v_stressy file stre_stress.txt
fix       ave all ave/atom 1 100 1000 v_mises c_peratom
dump      1 all custom 5000 2layerstre.*.lammpstrj id type xs ys zs f_ave[1] f_ave[2]
unfix     8
fix       5 stre move linear 0.0 0.05 0.0 units box
run            5000000
```

```
write_restart    stre*.restart
undump           1
```