Electronic Supplementary Material (ESI) for CrystEngComm.

Novel ultra-hard carbon structures by cold-compressing tubes

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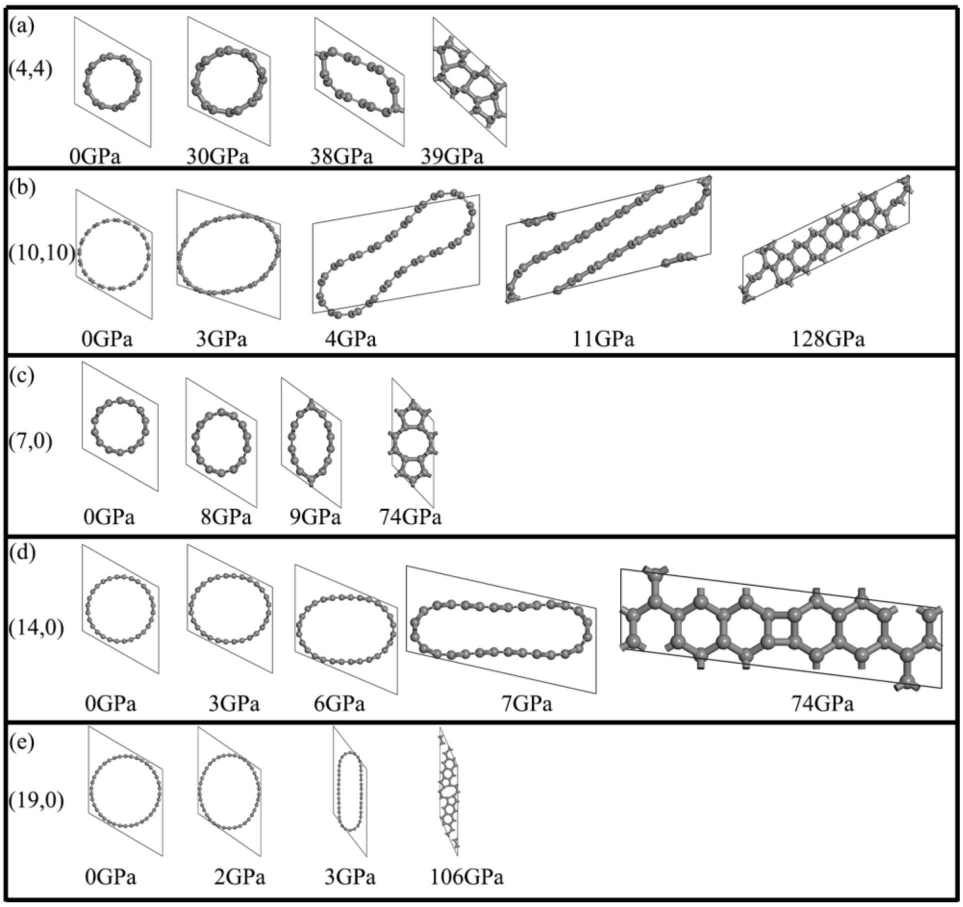

Fig.S1. The images of the structural deformation and the bonding or polymerization of adjacent tubes under pressure.

As shown in Fig.S1, the images of structural deformation and the bonding or polymerization of adjacent tubes are presented for selecting the (4, 4), (10, 10), (7, 0), (14, 0), (19, 0) tubes as the examples. For the small tubes such as (4, 4) and (7, 0), the

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cross section of tube transforms from circle to ellipse shape. For the larger tubes such as (10, 10), (14, 0) and (19, 0), the cross section transforms from circle to ellipse to racetrack shape, sometime forms the peanut shape. Further increase the pressure, the bonding occurs for the adjacent tubes and a new carbon allotrope is obtained by the completely polymerization.

Table S1. Columns 1-2 is the number and the chirality of selected tubes. Columns 3-6 are the symmetry group number, the group name, the phase and the forming pressure, respectively.

Number	**Chirality-Armchair**	**IT Number**	**Symmetry Group**	**Phase**	**Forming Pressure**
1	**(3,3)**	**69**	**FMMM(D2H-23)**	**Graphite**	**228**
2	**(4,4)**	**10**	**P2/M(C2H-1)**	**3-D(4,4)**	**39**
3	**(5,5)**	**227**	**FD-3M(OH-7)**	**C-Diamond**	**208**
4	**(6,6)**	**227**			**142**
5	**(7,7)**	**227**			**86**
6	**(8,8)**	**10**	**P2/M(C2H-P211)**	**3-D (8,8)**	**118**
7	**(9,9)**	**11**	**P21/M(C2H-2)**	**3-D (9,9)**	**86**
8	**(10,10)**	**10**	**P2/M(C2H-1)**	**3-D (10,10)**	**128**
Number	**Chirality-Zigzag**	**IT Number**	**Symmetry Group**	**Phase**	**Forming Pressure**
1	**(7,0)**	**63**	**CMCM(D2H-17)**	**3-D (7,0)**	**74**
2	**(8,0)**	**69**	**FMMM(D2H-23)**	**Graphite**	**29**
3	**(9,0)**	**193**	**P63/MCM(D6H-3)**	**3-D (9,0)**	**137**
4	**(10,0)**	**10**	**P2/M(C2H-1)**	**3-D (10,0)**	**41**
5	**(11,0)**	**69**	**FMMM(D2H-23)**	**Graphite**	**14**
6	**(12,0)**	**10**	**P2/M(C2H-1)**	**3-D (12,0)**	**100**
7	**(13,0)**	**194**	**P63/MMC(D6H-4)**	**H-Diamond**	**52**
8	**(14,0)**	**66**	**CCCM(D2H-20)**	**Cco-C112**	**74**
9	**(15,0)**	**11**	**P21/M(C2H-2)**	**3-D (15,0)**	**86**
10	**(16,0)**	**69**	**FMMM(D2H-23)**	**Graphite**	**7**
11	**(17,0)**	**11**	**P21/M(C2H-2)**	**3-D (17,0)**	**61**
12	**(18,0)**	**66**	**CCCM(D2H-20)**	**3-D (18,0)**	**130**
13	**(19,0)**	**11**	**P21/M(C2H-2)**	**3-D(19,0)**	**106**
14	**(20,0)**	**66**	**CCCM(D2H-20)**	**3-D(20,0)**	**82**

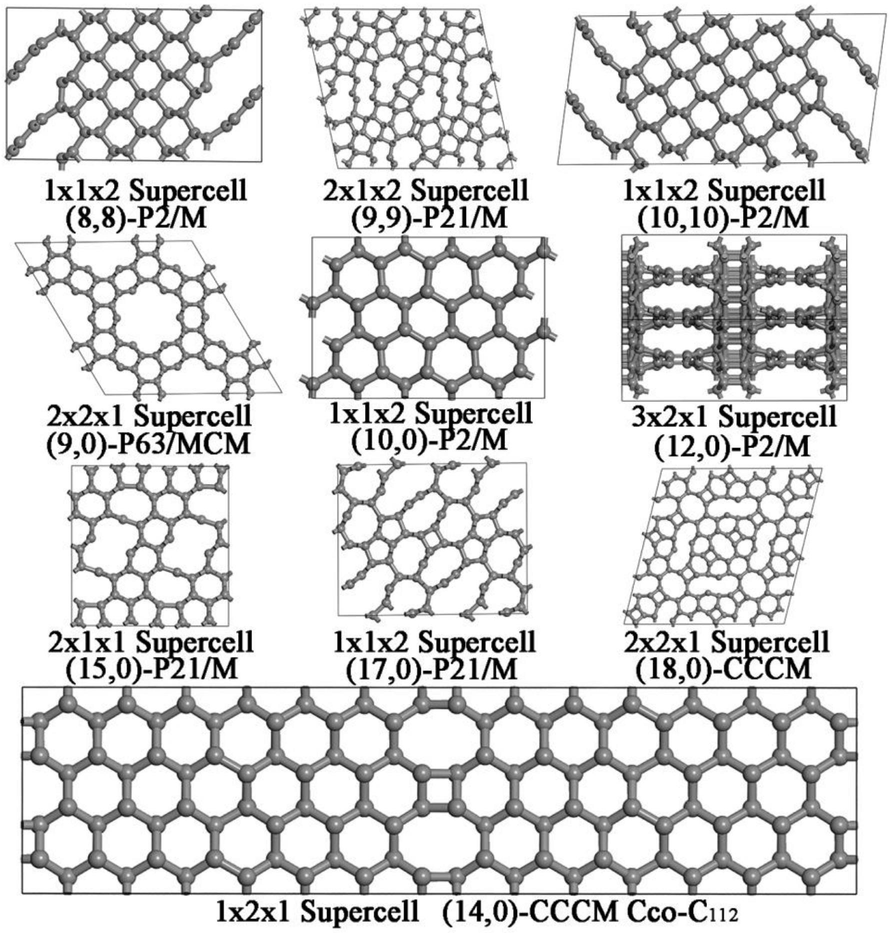

Fig.S2. The images of 3-D allotropes by the polymerization of (8, 8), (9, 9), (10, 10), (9, 0), (10, 0), (12, 0), (15, 0), (17, 0) and (18, 0).

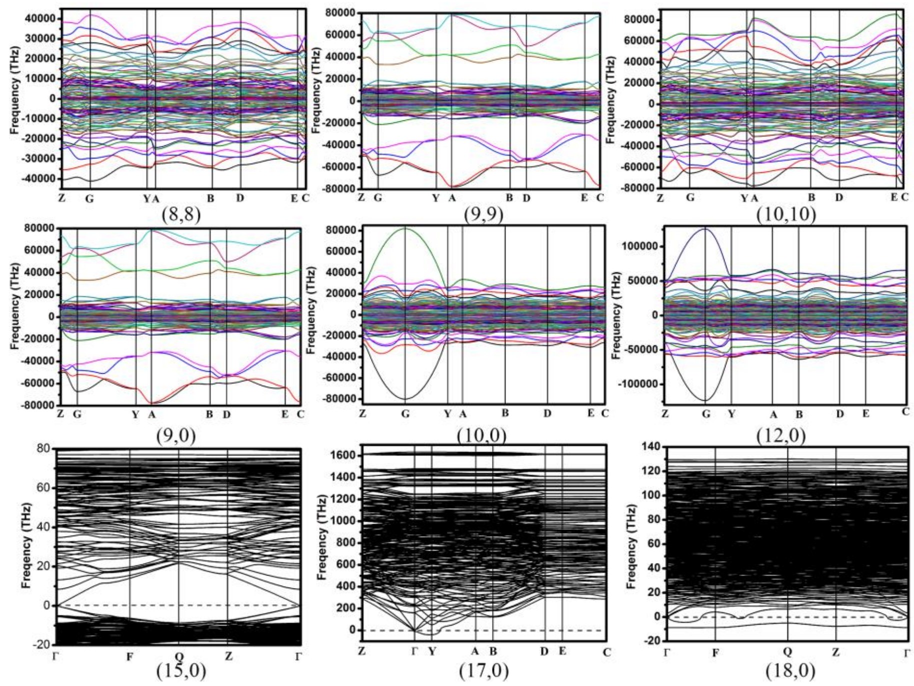

Fig.S3. The phonon dispersion spectra of 3-D (8, 8), 3-D (9, 9), 3-D (10, 10), 3-D (9, 0), 3-D (10, 0), 3-D (12, 0), 3-D (15, 0), 3-D (17, 0) and 3-D (18, 0). The exhibited imaginary frequency means that these 3-D polymers do not possess the dynamic stability.

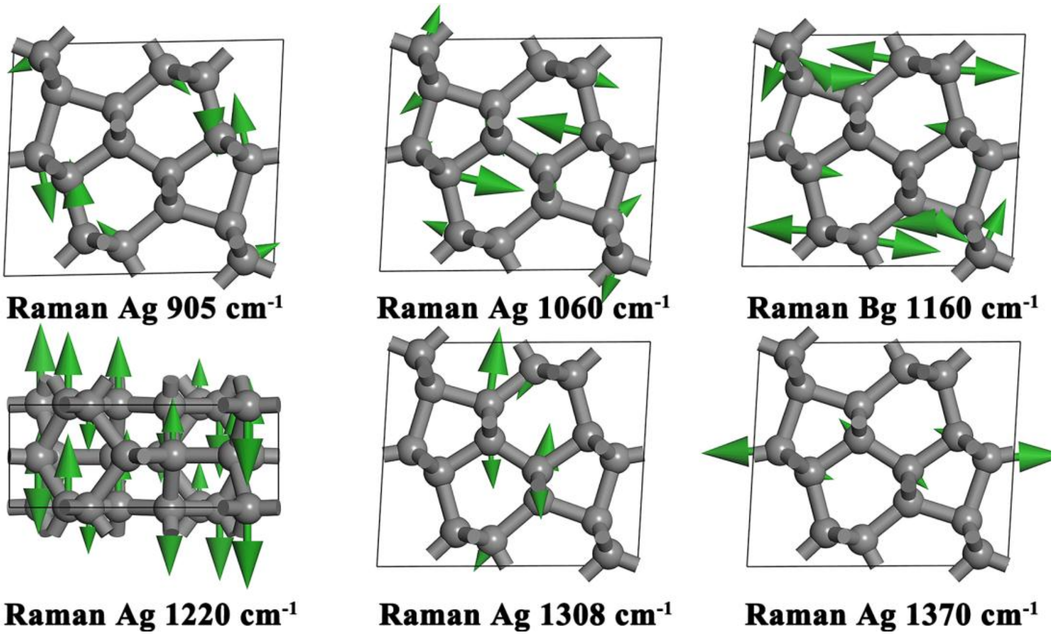

Fig.S4. Vibrational modes of L-carbon for the different Raman frequencies.

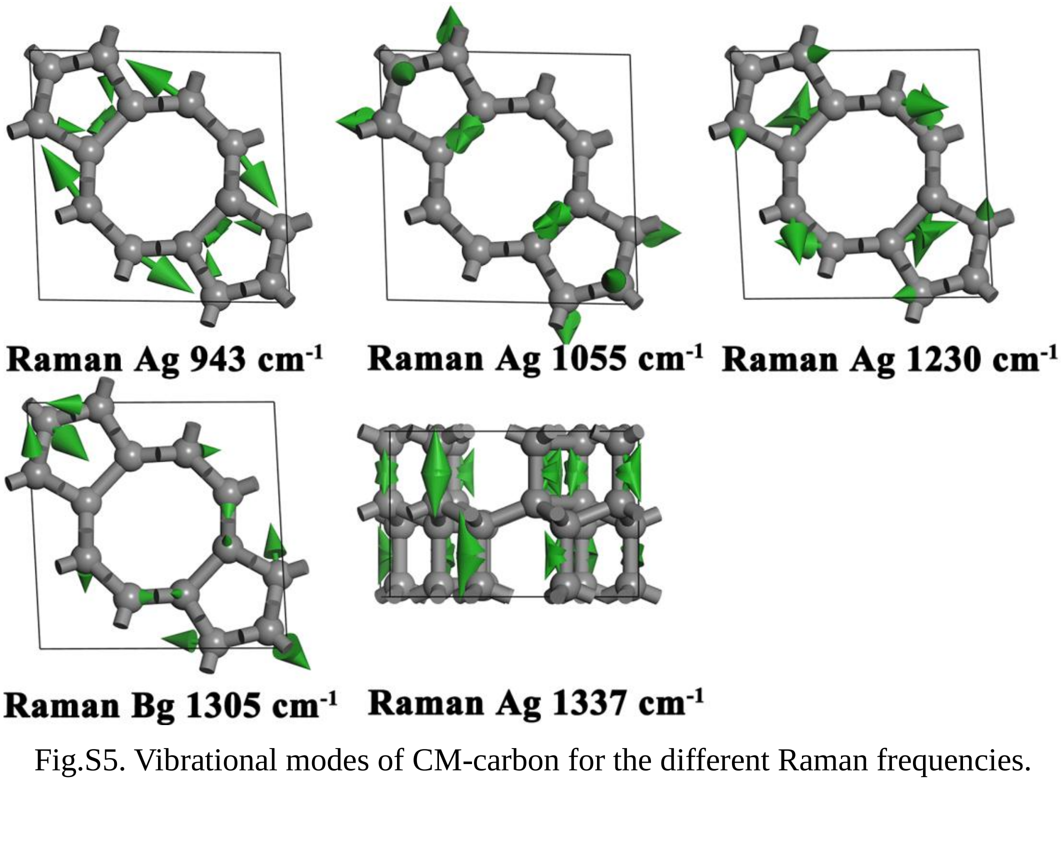

Fig.S5. Vibrational modes of CM-carbon for the different Raman frequencies.

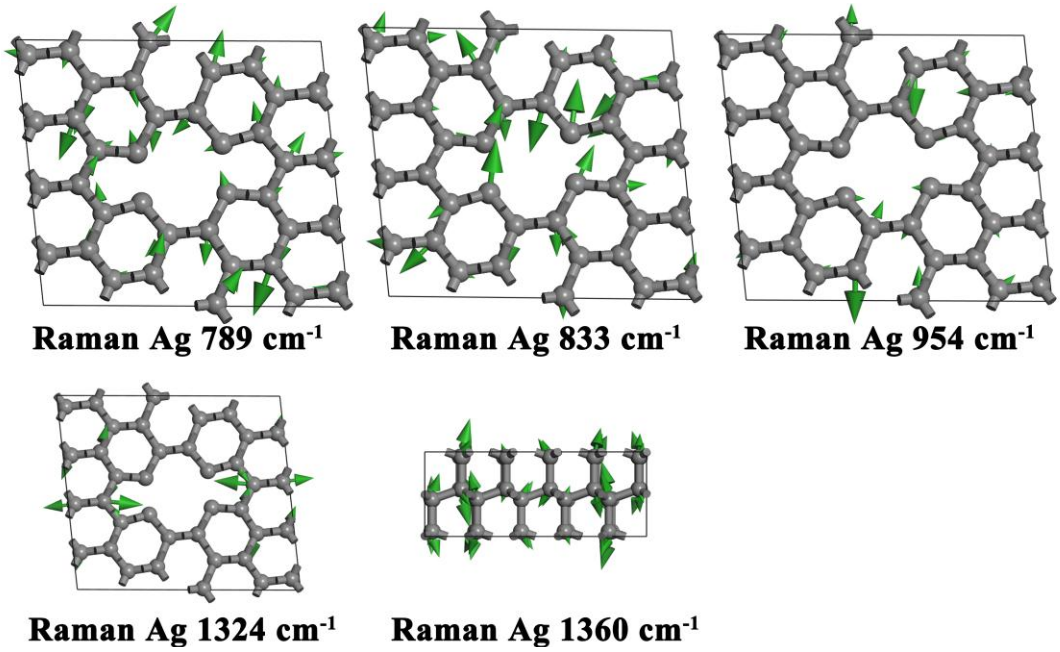

Fig.S6. Vibrational modes of K-carbon for the different Raman frequencies.

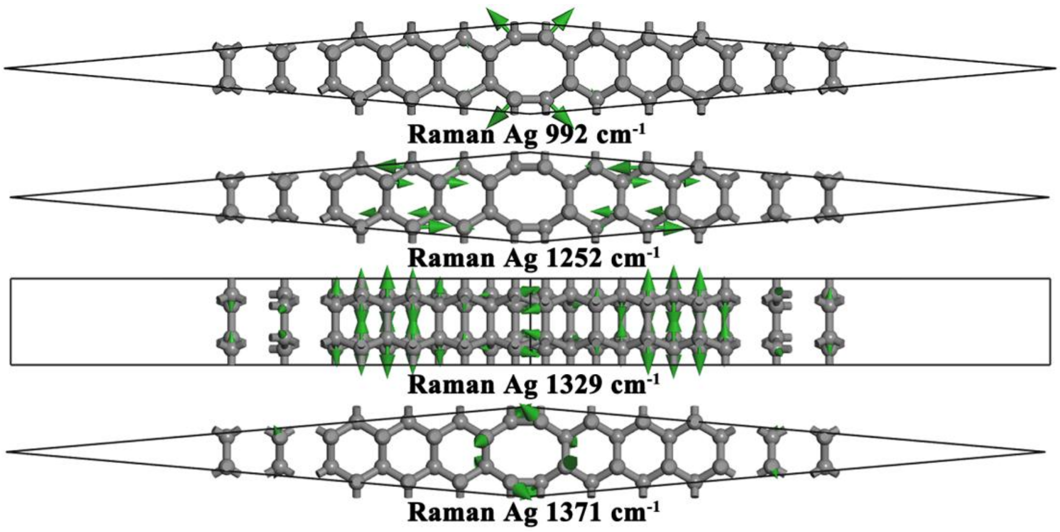

Fig.S7. Vibrational modes of Cco-C_{160} carbon for the different Raman frequencies.

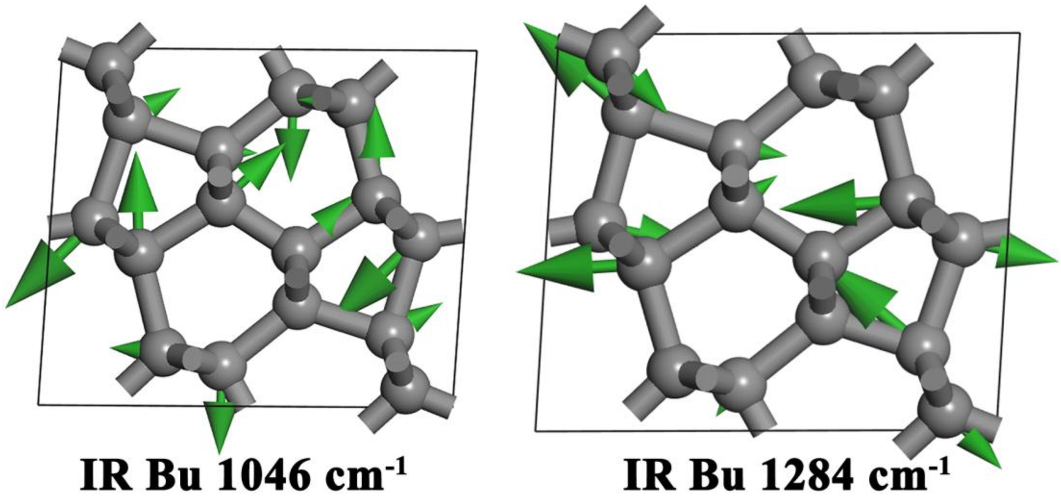

Fig.S8. Vibrational modes of L-carbon for the different IR frequencies.

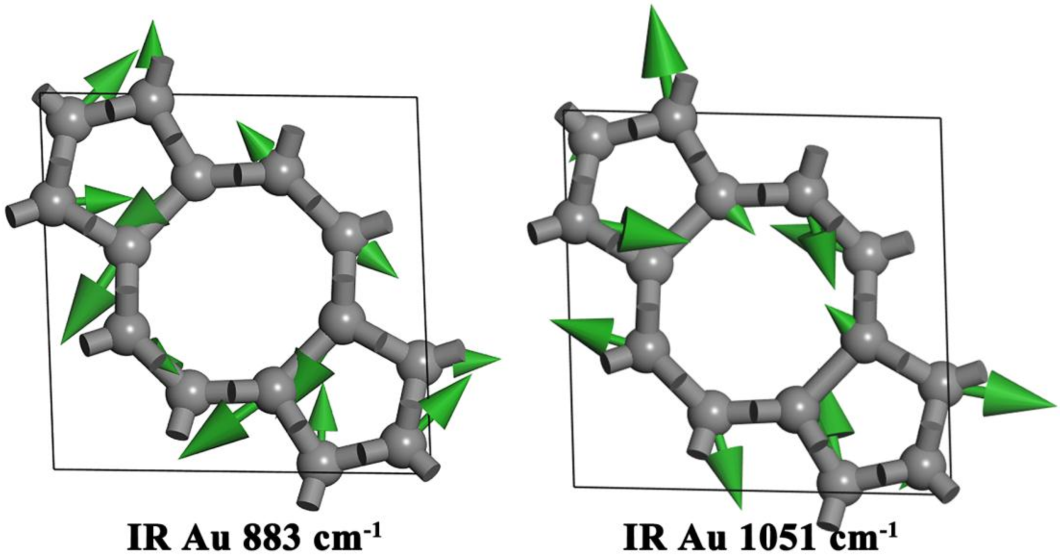

Fig.S9. Vibrational modes of CM-carbon for the different IR frequencies.

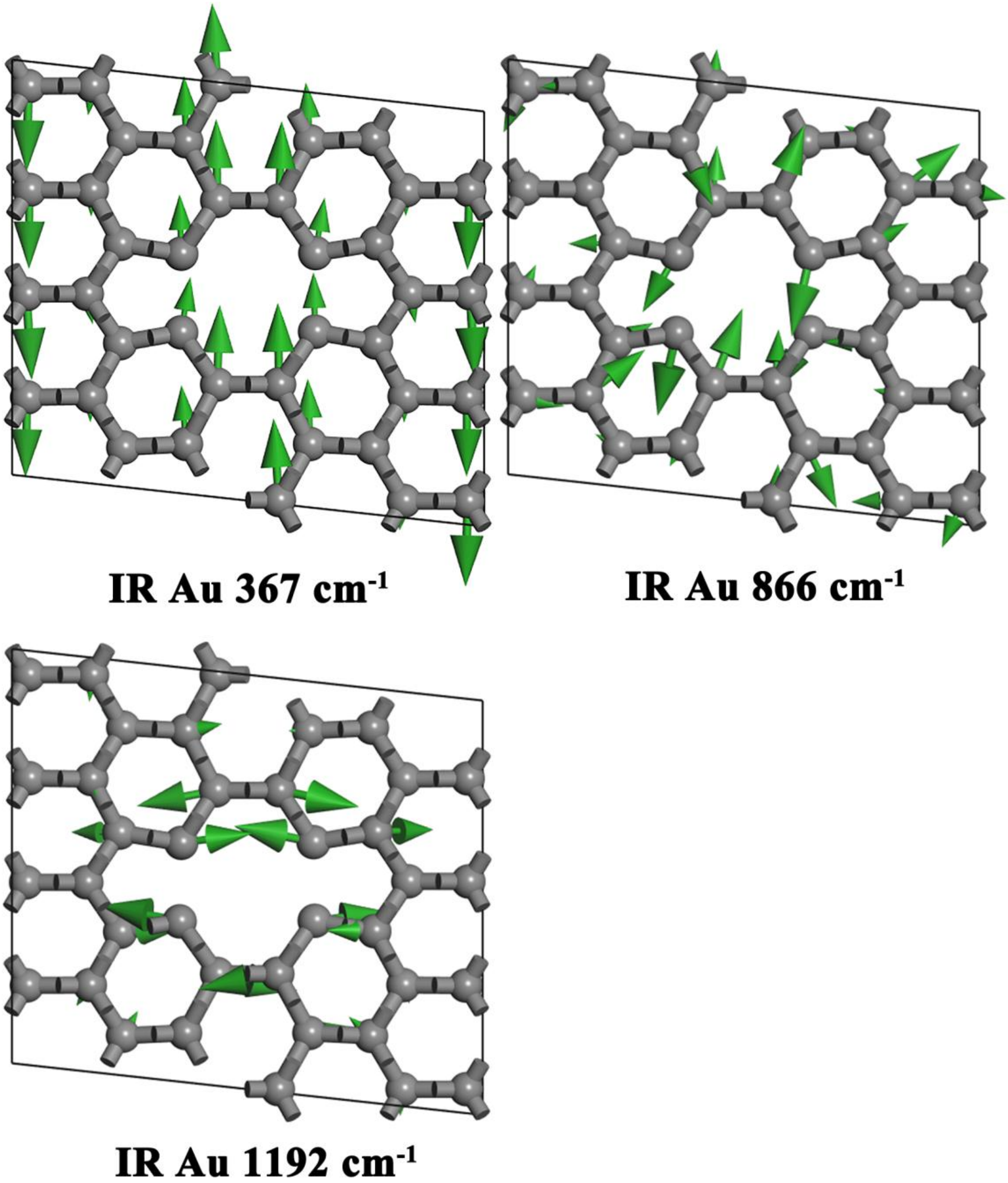

Fig.S10. Vibrational modes of K-carbon for the different IR frequencies.

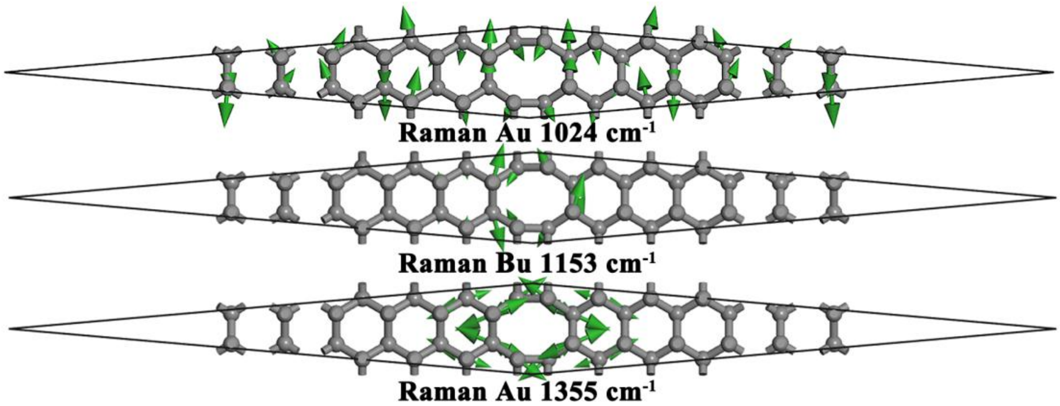

Fig.S11. Vibrational modes of Cco-C_{160} carbon for the different IR frequencies.

Table S2. Elastic tensor C_{ij} (in GPa) of monoclinic L-carbon:

C_{ij}	1	2	3	4	5	6
1	1248.798	74.340	190.786	0.000	-14.640	0.000
2	74.340	1330.058	122.298	0.000	44.999	0.000
3	190.786	122.298	1115.088	0.000	38.153	0.000
4	0.000	0.000	0.000	512.702	0.000	78.802
5	-14.640	44.999	38.153	0.000	507.502	0.000
6	0.000	0.000	0.000	78.802	0.000	502.108

Table S3. Elastic tensor C_{ij} (in GPa) of orthorhombic CM-carbon:

C_{ij}	1	2	3	4	5	6
1	1377.494	260.564	71.719	0.000	0.000	-12.023
2	260.564	1378.607	74.281	0.000	0.000	-0.184
3	71.719	74.281	1595.201	0.000	0.000	-28.083
4	0.000	0.000	0.000	463.345	33.372	0.000
5	0.000	0.000	0.000	33.372	466.390	0.000
6	-12.023	-0.184	-28.083	0.000	0.000	429.253

Table S4. Elastic tensor C_{ij} (in GPa) of monoclinic K-carbon:

C_{ij}	1	2	3	4	5	6
1	1553.345	61.689	257.064	0.000	0.722	0.000
2	61.689	1885.608	74.721	0.000	1.368	0.000
3	257.064	74.721	1638.242	0.000	6.931	0.000
4	0.000	0.000	0.000	525.104	0.000	-0.375
5	0.722	1.368	6.931	0.000	657.018	0.000
6	0.000	0.000	0.000	-0.375	0.000	523.359

Table S5. Elastic tensor C_{ij} (in GPa) of orthorhombic Cco-C160:

C_{ij}	1	2	3	4	5	6
1	1542.787	243.302	76.812	0.000	0.000	-3.265
2	243.302	1501.194	62.267	0.000	0.000	-0.370
3	76.812	62.267	1753.538	0.000	0.000	-1.271
4	0.000	0.000	0.000	524.860	1.171	0.000
5	0.000	0.000	0.000	1.171	511.460	0.000
6	-3.265	-0.370	-1.271	0.000	0.000	631.314

The mechanical stability criteria of monoclinic structure shown as follows:

$C_{11}>0$

$C_{22}>0$

$C_{33}>0$

$C_{44}>0$

$C_{55}>0$
$C_{66}>0$
$[C_{11}+C_{22}+C_{33}+2(C_{12}+C_{13}+C_{23})]>0$
$(C_{33}C_{55}-C_{35}C_{35})>0$
$(C_{44}C_{66}-C_{46}C_{46})>0$
$(C_{22}+C_{33}-2C_{23})>0$

$$(C_{22}(C_{33}C_{55}-C_{35}C_{35})+2C_{23}C_{25}C_{35}-C_{23}C_{23}C_{55}-C_{25}C_{25}C_{33})>0(2(C_{15}C_{25}(C_{33}C_{12}-C_{13}C_{23})+C_{15}C_{35}(C_{22}C_{13}-C_{12}C_{23})+C_{25}C_{35}(C_{11}C_{23}-C_{12}C_{13}))-(C_{15}C_{15}(C_{23}C_{33}-C_{23}C_{23})+C_{25}C_{25}(C_{11}C_{33}-C_{13}C_{13})+C_{35}C_{35}(C_{11}C_{22}-C_{12}C_{12}))+C_{55}g)>0$$

$$g=C_{11}C_{22}C_{33} - C_{11}C_{23}C_{23} - C_{22}C_{13}C_{13} - C_{33}C_{12}C_{12} + 2C_{12}C_{13}C_{23}$$

The monoclinic L-carbon and K-carbon are mechanically stable due to their elastic tensor C_{ij} satisfy to all the criteria.

The mechanical stability criteria of orthorhombic structure shown as follows:
$C_{11}>0$
$C_{22}>0$
$C_{33}>0$
$C_{44}>0$
$C_{55}>0$
$C_{66}>0$
$[C_{11}+C_{22}+C_{33}+2(C_{12}+C_{13}+C_{23})]>0$
$(C_{11}+C_{22}-2C_{12})>0$
$(C_{11}+C_{33}-2C_{13})>0$
$(C_{22}+C_{33}-2C_{23})>0$

The orthorhombic CM-carbon and Cco-C_{160} are mechanically stable due to their stiffness tensor C_{ij} satisfy to all the criteria.

The elastic tensor C_{ij} for the monoclinic phase and orthorhombic phase are presented as followings:
Monoclinic phase (C_{11}, C_{22}, C_{33}, C_{44}, C_{55}, C_{66}, C_{12}, C_{13}, C_{23}, C_{15}, C_{25}, C_{35}, and C_{46})
$B_V= 1/9(C_{11}+C_{22}+C_{33}+2C_{12}+C_{13}+C_{23})$
$G_V= 1/15(C_{11}+C_{22}+C_{33}+3C_{44}+C_{55}+C_{66}-C_{12}+C_{13}+C_{23})$
$B_R= \Omega[\mathrm{a}(C_{11}+C_{22}-2C_{12})+b(2C_{12}-2C_{11}-C_{23})+c(C_{15}-2C_{25})+d(2C_{12}+2C_{23}-C_{13}-2C_{22})+2(eC_{25}-C_{15})+\mathrm{f}]^{-1}$
$G_R= 15\{4a(C_{11}+C_{22}+C_{12})+b(C_{11}-C_{12}-C_{23})+c(C_{15}+C25)+d(C_{22}-C_{12}-C_{23}-C_{13})+e(C_{15}-C_{25})+f]/\Omega+3[g/\Omega+(C_{44}+C_{66})/(C_{44}C_{66}-C_{46}C_{46}]\}^{-1}$
$a= C_{33}C_{55}-C_{35}C_{35}$
$b= C_{23}C_{55}-C_{25}C_{35}$
$c= C_{13}C_{35}-C_{15}C_{33}$

$d = C_{13}C_{55} - C_{15}C_{35}$

$e = C_{13}C_{25} - C_{15}C_{23}$

$f = C_{11}(C_{22}C_{55} - C_{25}C_{25}) - C_{12}(C_{12}C_{55} - C_{15}C_{25}) + C_{15}(C_{12}C_{25} - C_{15}C_{22}) + C_{25}(C_{23}C_{35} - C_{25}C_{33})$

$g = C_{11}C_{22}C_{33} - C_{11}C_{23}C_{23} - C_{22}C_{13}C_{13} - C_{33}C_{12}C_{12} + 2C_{12}C_{13}C_{23}$

$\Omega = 2[C_{15}C_{25}(C_{33}C_{12} - C_{13}C_{23}) + C_{15}C_{35}(C_{22}C_{13} - C_{12}C_{23}) + C_{25}C_{35}(C_{11}C_{23} - C_{12}C_{13})] - C_{15}C_{15}(C_{22}C_{33} - C_{23}C_{23}) + C_{25}C_{25}(C_{11}C_{33} - C_{13}C_{13}) + C_{35}C_{35}(C_{11}C_{22} - C_{12}C_{12}) + gC_{55}$

Orthorhombic phase (C_{11}, C_{22}, C_{33}, C_{44}, C_{55}, C_{66}, C_{12}, C_{13}, and C_{23})

$B_V = (1/9)[C_{11} + C_{22} + C_{33} + 2(C_{12} + C_{13} + C_{23})]$

$G_V = 1/15[C_{11} + C_{22} + C_{33} + 3(C_{44} + C_{55} + C_{66}) - (C_{12} + C_{13} + C_{23})]$

$B_R = \Delta[C_{11}(C_{22} + C_{33} - 2C_{23}) + C_{22}(C_{33} - 2C_{13}) - 2C_{33}C_{12} + C_{12}(2C_{23} - C_{12}) + C_{13}(2C_{12} - C_{13}) + C_{23}(2C_{13} - C_{23})]^{-1}$

$G_R = 15\{4[C_{11}(C_{22} + C_{33} + C_{23}) + C_{22}(C_{33} + C_{13}) + C_{33}C_{12} - C_{12}(C_{23} + C_{12}) - C_{13}(C_{12} + C_{13}) - C_{23}(C_{13} + C_{23})]/\Delta + 3[(1/C_{44}) + (1/C_{55}) + (1/C_{66})]\}^{-1}$

$\Delta = C_{13}(C_{12}C_{23} - C_{13}C_{22}) + C_{23}(C_{12}C_{13} - C_{23}C_{11}) + C_{33}(C_{11}C_{22} - C_{12}C_{12})$

Table S6. K-points of phonon dispersions (Fig. 4) and band structures (Fig. 6).

L-carbon	Gamma	0.000	0.000	0.000
	Z	0.000	0.500	0.000
	D	0.000	0.500	0.500
	B	0.000	0.000	0.500
	Gamma	0.000	0.000	0.000
	A	-0.500	0.000	0.500
	E	-0.500	0.500	0.500
	Z	0.000	0.500	0.000
	C_2	-0.500	0.500	0.000
	Y_2	-0.500	0.000	0.000
	Gamma	0.000	0.000	0.000
CM-carbon	Gamma	0.000	0.000	0.000
	Y	-0.500	0.500	0.000
	C_0	-0.477	0.520	0.000
	Gamma	0.000	0.000	0.000
	Z	0.000	0.000	0.500

	A_0	0.477	0.477	0.500
	T	-0.500	0.500	0.500
	Gamma	0.000	0.000	0.000
	S	0.000	0.500	0.000
	R	0.000	0.500	0.500
	Z	0.000	0.000	0.500
	T	-0.500	0.500	0.500
K-carbon	Gamma	0.000	0.000	0.000
	Z	0.000	0.500	0.000
	D	0.000	0.500	0.500
	B	0.000	0.000	0.500
	Gamma	0.000	0.000	0.000
	A	-0.500	0.000	0.500
	E	-0.500	0.500	0.500
	Z	0.000	0.500	0.000
	C_2	-0.500	0.500	0.000
	Y_2	-0.500	0.000	0.000
	Gamma	0.000	0.000	0.000
Cco-C_{160}	Gamma	0.000	0.000	0.000
	Y	-0.500	0.500	0.000
	C_0	-0.252	0.748	0.000
	Gamma	0.000	0.000	0.000
	Z	0.000	0.000	0.500
	E_0	0.252	0.748	0.500
	T	-0.500	0.500	0.500
	Gamma	0.000	0.000	0.000
	S	0.000	0.500	0.000
	R	0.000	0.500	0.500
	Z	0.000	0.000	0.500

	T	-0.500	0.500	0.500

POSCAR of L-carbon:

```
L-carbon
1.0
        6.6089000702         0.0000000000         0.0000000000
        0.0000000000         2.5220000744         0.0000000000
       -0.3500462159         0.0000000000         5.6791221824
    C
   16
Direct
     0.833559958         0.500000000         0.798179934
     0.166439993         0.500000000         0.201819987
     0.563560018         0.500000000         0.117329990
     0.436439989         0.500000000         0.882669983
     0.108369999         0.500000000         0.478899950
     0.891629960         0.500000000         0.521099971
     0.392560007         0.500000000         0.284790008
     0.607439964         0.500000000         0.715209954
     0.884210024        -0.000000000         0.947950012
     0.115790003        -0.000000000         0.052049998
     0.705980005         0.000000000         0.151309994
     0.294019981         0.000000000         0.848689916
     0.404680001         0.000000000         0.431989974
     0.595320004         0.000000000         0.568009947
     0.218579986        -0.000000000         0.578619997
     0.781420005        -0.000000000         0.421380008
```

POSCAR of CM-carbon

```
CM-carbon
1.0
        6.3155999184         0.0000000000         0.0000000000
        0.3018338130         6.3083832064         0.0000000000
        0.0000000000         0.0000000000         4.2165398598
    C
   28
Direct
     0.204332998         0.632601943         0.065141995
     0.795667033         0.367397984         0.565141967
     0.632602006         0.204333003         0.434858005
     0.367398005         0.795666944         0.934858033
     0.795667033         0.367397984         0.934858033
```

0.204332998 0.632601943 0.434858005
0.367398005 0.795666944 0.565141967
0.632602006 0.204333003 0.065141995
0.219252012 0.405953989 0.565195005
0.780747999 0.594045977 0.065195005
0.405953984 0.219252004 0.934804995
0.594045986 0.780748018 0.434804995
0.780747999 0.594045977 0.434804995
0.219252012 0.405953989 0.934804995
0.594045986 0.780748018 0.065195005
0.405953984 0.219252004 0.565195005
0.021747001 0.292721000 0.062783001
0.978253044 0.707278965 0.562783022
0.292721011 0.021746999 0.437218024
0.707279038 0.978252961 0.937216978
0.978253044 0.707278965 0.937216978
0.021747001 0.292721000 0.437218024
0.707279038 0.978252961 0.562783022
0.292721011 0.021746999 0.062783001
0.074598998 0.074598996 0.562928961
0.925400999 0.925400950 0.062928997
0.074598998 0.074598996 0.937071039
0.925400999 0.925400950 0.437070982

POSCAR of K-carbon:
K-carbon
1.0
11.0530700684 0.0000000000 0.0000000000
0.0000000000 4.1911301613 0.0000000000
1.0547420105 0.0000000000 9.6101930966
C
76
Direct
0.565771991 0.935825981 0.269786016
0.434227993 0.064173998 0.730214000
0.434227993 0.435826009 0.730214000
0.565771991 0.564174019 0.269786016
0.642423953 0.434864998 0.387382018
0.357576027 0.565135002 0.612618048
0.357576027 0.934864998 0.612618048
0.642423953 0.065135002 0.387382018
0.771230977 0.936943003 0.345936001
0.228768988 0.063056997 0.654063991
0.228768988 0.436943003 0.654063991

223	0.771230977	0.563056997	0.345936001
224	0.834319050	0.436802010	0.209739011
225	0.165681001	0.563197961	0.790260981
226	0.165681001	0.936802039	0.790260981
227	0.834319050	0.063197997	0.209739011
228	0.968164078	0.937096028	0.191718997
229	0.031835996	0.062904001	0.808280995
230	0.031835996	0.437095999	0.808280995
231	0.968164078	0.562903972	0.191718997
232	0.034984001	0.437140001	0.057851999
233	0.965015987	0.562859999	0.942147980
234	0.965015987	0.937140001	0.942147980
235	0.034984001	0.062859999	0.057851999
236	0.170065999	0.937062977	0.041034002
237	0.829933972	0.062937002	0.958966051
238	0.829933972	0.437063005	0.958966051
239	0.170065999	0.562937023	0.041034002
240	0.235633001	0.437263018	0.904669035
241	0.764366982	0.562737010	0.095331000
242	0.764366982	0.937262990	0.095331000
243	0.235633001	0.062737003	0.904669035
244	0.368384958	0.937153995	0.880692001
245	0.631614985	0.062845998	0.119308003
246	0.631614985	0.437153995	0.119308003
247	0.368384958	0.562846005	0.880692001
248	0.434827000	0.437231987	0.008153000
249	0.565172943	0.562767957	0.991847009
250	0.565172943	0.937232043	0.991847009
251	0.434827000	0.062766997	0.008153000
252	0.368958992	0.937134995	0.151841003
253	0.631040988	0.062864998	0.848159062
254	0.631040988	0.437135024	0.848159062
255	0.368958992	0.562865005	0.151841003
256	0.236805991	0.437203998	0.160887008
257	0.763194078	0.562796002	0.839113033
258	0.763194078	0.937203998	0.839113033
259	0.236805991	0.062795994	0.160887008
260	0.168360001	0.936770979	0.292987995
261	0.831639964	0.063229000	0.707011997
262	0.831639964	0.436771007	0.707011997
263	0.168360001	0.563229021	0.292987995
264	0.036450997	0.436943999	0.307758982
265	0.963549066	0.563055973	0.692241010
266	0.963549066	0.936944027	0.692241010

0.036450997	0.063056001	0.307758982
0.969741938	0.936385971	0.440438984
0.030257998	0.063614001	0.559561032
0.030257998	0.436385999	0.559561032
0.969741938	0.563614029	0.440438984
0.842176068	0.437254997	0.456304045
0.157824003	0.562744974	0.543695971
0.157824003	0.937255026	0.543695971
0.842176068	0.062744996	0.456304045
0.770656018	0.936986009	0.585098051
0.229344005	0.063013998	0.414902014
0.229344005	0.436986009	0.414902014
0.770656018	0.563013991	0.585098051
0.642050977	0.434868980	0.575689960
0.357948969	0.565131020	0.424310006
0.357948969	0.934868980	0.424310006
0.642050977	0.065130999	0.575689960
0.565533975	0.935774043	0.713505039
0.434465015	0.064225999	0.286495002
0.434465015	0.435773986	0.286495002
0.565533975	0.564225957	0.713505039

POSCAR of Cco-C_{160}:

Cco-C_{160}

1.0

50.4929008484	0.0000000000	0.0000000000
0.0000000000	4.3797001839	0.0000000000
0.0000000000	0.0000000000	4.1967000961

C

160

Direct

0.287590005	0.665760052	0.813750026
0.712409958	0.334240003	0.186250003
0.712409958	0.334240003	0.813750026
0.287590005	0.665760052	0.186250003
0.712409958	0.665760052	0.686249974
0.287590005	0.334240003	0.313749997
0.287590005	0.334240003	0.686249974
0.712409958	0.665760052	0.313749997
0.787590005	0.165760011	0.813750026
0.212409995	0.834239948	0.186250003
0.212409995	0.834239948	0.813750026
0.787590005	0.165760011	0.186250003
0.212409995	0.165760011	0.686249974

311	0.787590005	0.834239948	0.313749997
312	0.787590005	0.834239948	0.686249974
313	0.212409995	0.165760011	0.313749997
314	0.763459974	0.338280032	0.315880011
315	0.236540007	0.661719995	0.684120017
316	0.236540007	0.661719995	0.315880011
317	0.763459974	0.338280032	0.684120017
318	0.236540007	0.338280032	0.184119946
319	0.763459974	0.661719995	0.815879983
320	0.763459974	0.661719995	0.184119946
321	0.236540007	0.338280032	0.815879983
322	0.263459974	0.838280005	0.315880011
323	0.736539988	0.161720036	0.684120017
324	0.736539988	0.161720036	0.315880011
325	0.263459974	0.838280005	0.684120017
326	0.736539988	0.838280005	0.184119946
327	0.263459974	0.161720036	0.815879983
328	0.263459974	0.161720036	0.184119946
329	0.736539988	0.838280005	0.815879983
330	0.837369964	0.166580025	0.812730042
331	0.162629998	0.833419961	0.187270001
332	0.162629998	0.833419961	0.812730042
333	0.837369964	0.166580025	0.187270001
334	0.162629998	0.166580025	0.687269958
335	0.837369964	0.833419961	0.312730013
336	0.837369964	0.833419961	0.687269958
337	0.162629998	0.166580025	0.312730013
338	0.337369964	0.666580039	0.812730042
339	0.662629998	0.333420043	0.187270001
340	0.662629998	0.333420043	0.812730042
341	0.337369964	0.666580039	0.187270001
342	0.662629998	0.666580039	0.687269958
343	0.337369964	0.333420043	0.312730013
344	0.337369964	0.333420043	0.687269958
345	0.662629998	0.666580039	0.312730013
346	0.812500005	0.333230030	0.312600030
347	0.187499995	0.666769970	0.687399999
348	0.187499995	0.666769970	0.312600030
349	0.812500005	0.333230030	0.687399999
350	0.187499995	0.333230030	0.187399984
351	0.812500005	0.666769970	0.812600001
352	0.812500005	0.666769970	0.187399984
353	0.187499995	0.333230030	0.812600001
354	0.312500005	0.833230030	0.312600030

355	0.687500033	0.166769984	0.687399999
356	0.687500033	0.166769984	0.312600030
357	0.312500005	0.833230030	0.687399999
358	0.687500033	0.833230030	0.187399984
359	0.312500005	0.166769984	0.812600001
360	0.312500005	0.166769984	0.187399984
361	0.687500033	0.833230030	0.812600001
362	0.887109958	0.166570009	0.812719986
363	0.112889995	0.833429977	0.187280000
364	0.112889995	0.833429977	0.812719986
365	0.887109958	0.166570009	0.187280000
366	0.112889995	0.166570009	0.687280014
367	0.887109958	0.833429977	0.312720015
368	0.887109958	0.833429977	0.687280014
369	0.112889995	0.166570009	0.312720015
370	0.387109995	0.666570023	0.812719986
371	0.612890005	0.333430059	0.187280000
372	0.612890005	0.333430059	0.812719986
373	0.387109995	0.666570023	0.187280000
374	0.612890005	0.666570023	0.687280014
375	0.387109995	0.333430059	0.312720015
376	0.387109995	0.333430059	0.687280014
377	0.612890005	0.666570023	0.312720015
378	0.862239998	0.333430005	0.312699960
379	0.137760002	0.666570023	0.687300011
380	0.137760002	0.666570023	0.312699960
381	0.862239998	0.333430005	0.687300011
382	0.137760002	0.333430005	0.187299969
383	0.862239998	0.666570023	0.812699989
384	0.862239998	0.666570023	0.187299969
385	0.137760002	0.333430005	0.812699989
386	0.362239998	0.833429977	0.312699960
387	0.637759964	0.166569954	0.687300011
388	0.637759964	0.166569954	0.312699960
389	0.362239998	0.833429977	0.687300011
390	0.637759964	0.833429977	0.187299969
391	0.362239998	0.166569954	0.812699989
392	0.362239998	0.166569954	0.187299969
393	0.637759964	0.833429977	0.812699989
394	0.936869972	0.166549976	0.812619999
395	0.063130000	0.833450010	0.187380001
396	0.063130000	0.833450010	0.812619999
397	0.936869972	0.166549976	0.187380001
398	0.063130000	0.166549976	0.687380001

399	0.936869972	0.833450010	0.312619971
400	0.936869972	0.833450010	0.687380001
401	0.063130000	0.166549976	0.312619971
402	0.436870010	0.666549990	0.812619999
403	0.563130028	0.333450092	0.187380001
404	0.563130028	0.333450092	0.812619999
405	0.436870010	0.666549990	0.187380001
406	0.563130028	0.666549990	0.687380001
407	0.436870010	0.333450092	0.312619971
408	0.436870010	0.333450092	0.687380001
409	0.563130028	0.666549990	0.312619971
410	0.911989965	0.333329976	0.312669993
411	0.088009998	0.666670024	0.687330007
412	0.088009998	0.666670024	0.312669993
413	0.911989965	0.333329976	0.687330007
414	0.088009998	0.333329976	0.187330007
415	0.911989965	0.666670024	0.812669993
416	0.911989965	0.666670024	0.187330007
417	0.088009998	0.333329976	0.812669993
418	0.411990002	0.833329976	0.312669993
419	0.588009998	0.166670078	0.687330007
420	0.588009998	0.166670078	0.312669993
421	0.411990002	0.833329976	0.687330007
422	0.588009998	0.833329976	0.187330007
423	0.411990002	0.166670078	0.812669993
424	0.411990002	0.166670078	0.187330007
425	0.588009998	0.833329976	0.812669993
426	0.985409942	0.165549992	0.813460006
427	0.014590000	0.834450022	0.186539994
428	0.014590000	0.834450022	0.813460006
429	0.985409942	0.165549992	0.186539994
430	0.014590000	0.165549992	0.686539994
431	0.985409942	0.834450022	0.313460006
432	0.985409942	0.834450022	0.686539994
433	0.014590000	0.165549992	0.313460006
434	0.485410018	0.665549978	0.813460006
435	0.514590020	0.334449994	0.186539994
436	0.514590020	0.334449994	0.813460006
437	0.485410018	0.665549978	0.186539994
438	0.514590020	0.665549978	0.686539994
439	0.485410018	0.334449994	0.313460006
440	0.485410018	0.334449994	0.686539994
441	0.514590020	0.665549978	0.313460006
442	0.961700041	0.337729998	0.314100038

443	0.038299999	0.662270029	0.685899962
444	0.038299999	0.662270029	0.314100038
445	0.961700041	0.337729998	0.685899962
446	0.038299999	0.337729998	0.185899976
447	0.961700041	0.662270029	0.814100038
448	0.961700041	0.662270029	0.185899976
449	0.038299999	0.337729998	0.814100038
450	0.461700003	0.837729971	0.314100038
451	0.538299959	0.162270070	0.685899962
452	0.538299959	0.162270070	0.314100038
453	0.461700003	0.837729971	0.685899962
454	0.538299959	0.837729971	0.185899976
455	0.461700003	0.162270070	0.814100038
456	0.461700003	0.162270070	0.185899976
457	0.538299959	0.837729971	0.814100038