

Diamond panel stacks

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<http://web.me.com/whitby/Octahedron/Welcome.html>

References

1. Octahedron1stEd.pdf The octahedral periodicity of the Atomic Elements and its implications by Robert William Whitby

<http://homepage.mac.com/whitby/FileSharing103.html>

2. Diamondoids by Robert William Whitby. (Ad-, Di-, Tetr-, and Dec-amantane)

<http://homepage.mac.com/whitby/Quasicrystals/FileSharing186.html>

3. Diamondoid–cyclohexamantane by Robert William Whitby

<http://homepage.mac.com/whitby/Quasicrystals/FileSharing187.html>

4. Isolation and Structure of Higher Diamondoids, Nanometer-Sized Diamond Molecules by J. E. Dahl, S. G. Liu, R. M. K. Carlson, ChevronTexaco, Post Office Box 1627, Richmond, CA 94802, USA.

<http://moleculardevices.org/diamond-isol.pdf>

Introduction

This paper looks at the relationship between diamond CFUs within facial panels, within helical assemblies, and between adjoining panels.

Panels

Figures 1 and 2 show a symmetrical rod composed of three recurring assemblies of diamond CFUs.

Figures 5 through 9 show how 2-triangles of diamond CFUs join as panels and how the panels join with one another.

Helixes

Both threefold and fourfold helixes are described in Reference 4.

Figure 3 shows how identical pairs of diamond CFUs join as threefold helixes of opposite sense.

Figure 4 shows how diamond CFUs join as fourfold helixes of opposite sense.

Fig. 1 Axially symmetrical rod of three recurring diamond assemblies

The figure shows how three assemblies consisting of diamond CFUs can form a symmetrical rod. A 2-triangle of four diamond CFUs labeled A is shown at the top of the lefthand column. Directly under it is a ring of six CFUs labeled B. Next down is a 2-triangle labeled C. It differs from A by one half turn about the bottom edge of the page. The three assemblies are incorporated as ABC which is shown at the bottom of the column. Triangle A is furthest from the viewer, ring B is joined to A by three of its CFUs, and triangle C is joined to B by three of its CFUs. ABC can be joined with identical units to form a rod. The join between C and A is between their central CFUs.

The right-hand column shows the relationship between each axially adjacent pair of assemblies. B is atop A in AB; C is atop B in BC; and A is atop C in CA.

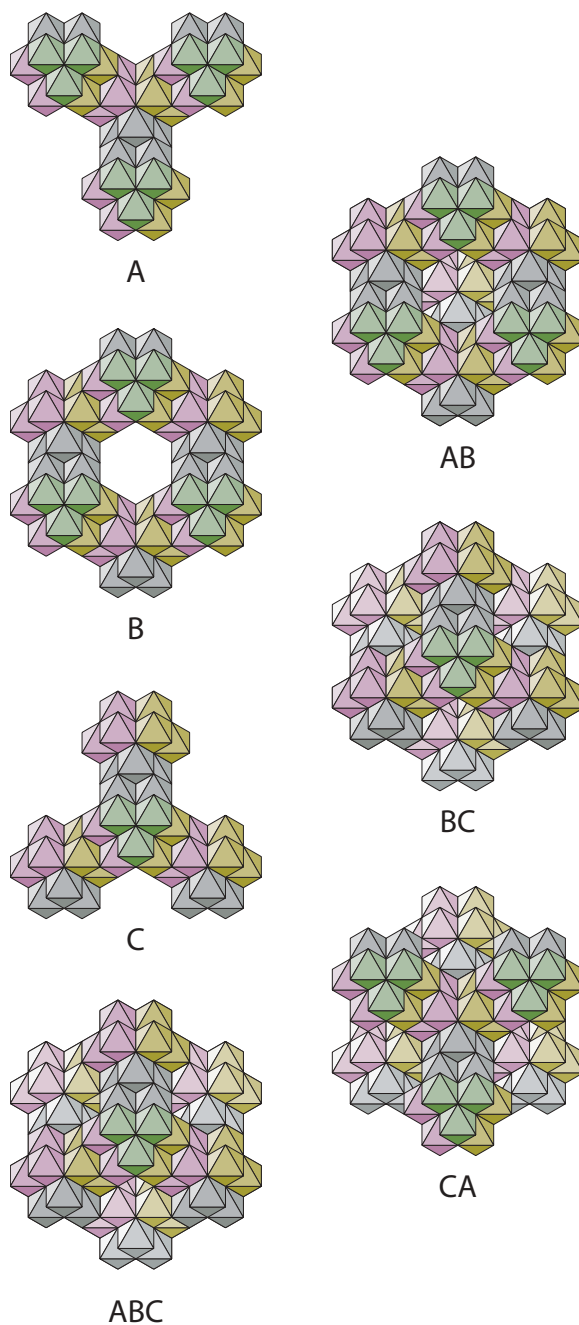


Fig. 2 CFU layers of ABC

Each of the CFU layers of the three assembly unit ABC of Figure 1 is shown in the lefthand column of the figure. Each layer is identified with a letter. Layer A is furthest from the viewer; layer F is nearest to the viewer.

Layers A and B contain the units of the far 2-triangle; layers C and D contain the units of the middle ring; layers E and F contain the units of the near 2-triangle. The CFUs of each layer are identically oriented. The CFUs of adjacent layers are inverted. The CFUs of layers A, C, and E are identically oriented; the CFUs of B, D, and F are identically oriented.

Layers A through F are assembled as ABCDEF.

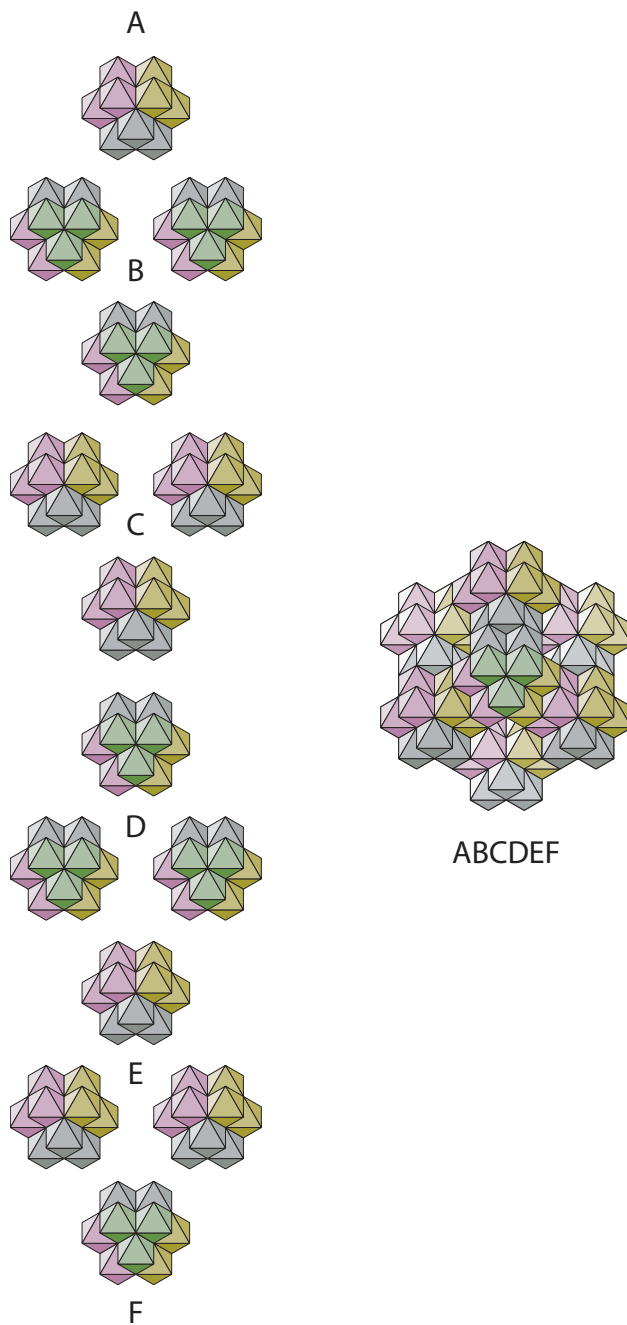
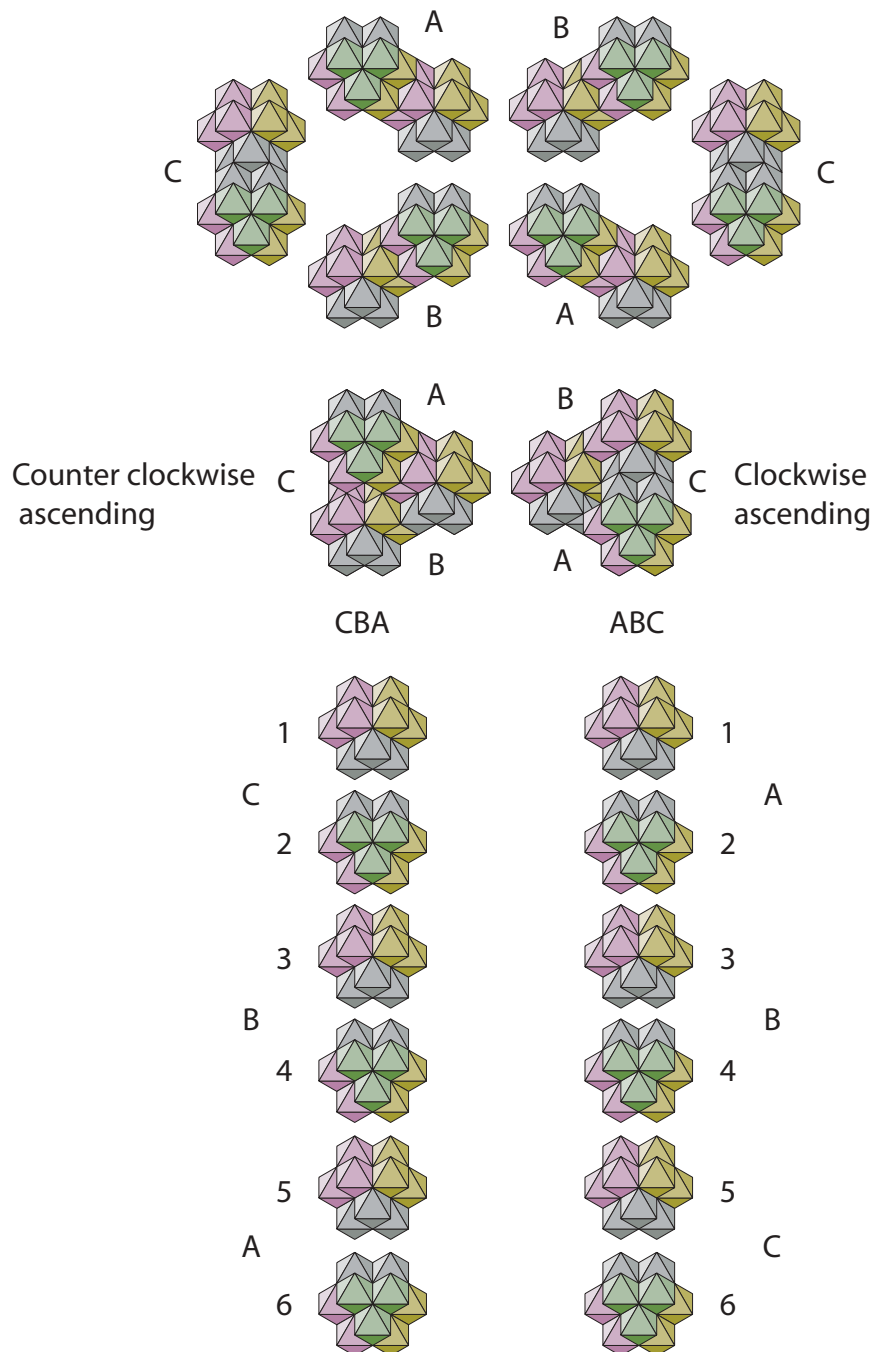


Fig. 3 Threefold helical assemblies of diamond CFUs

The figure shows how three identical pairs of diamond CFUs can be joined to form helices with different senses—counter-clockwise ascending and clockwise ascending. Ascending is defined here as towards the viewer. Each pair is labeled A, B, or C according to its orientation. Each orientation differs by one-third turn about a normal to the viewing plane.

The counter-clockwise ascending helix is shown in the lefthand column. The three pairs which constitute it are shown at the top. C is the furthest from the viewer. B joins to C and A joins to B to complete the helical turn CBA. Each of the CFUs of the turn is on a separate layer. The layers are shown in the column below CBA.

The clockwise ascending helix is shown on the right. A is furthest from the viewer and C is nearest.



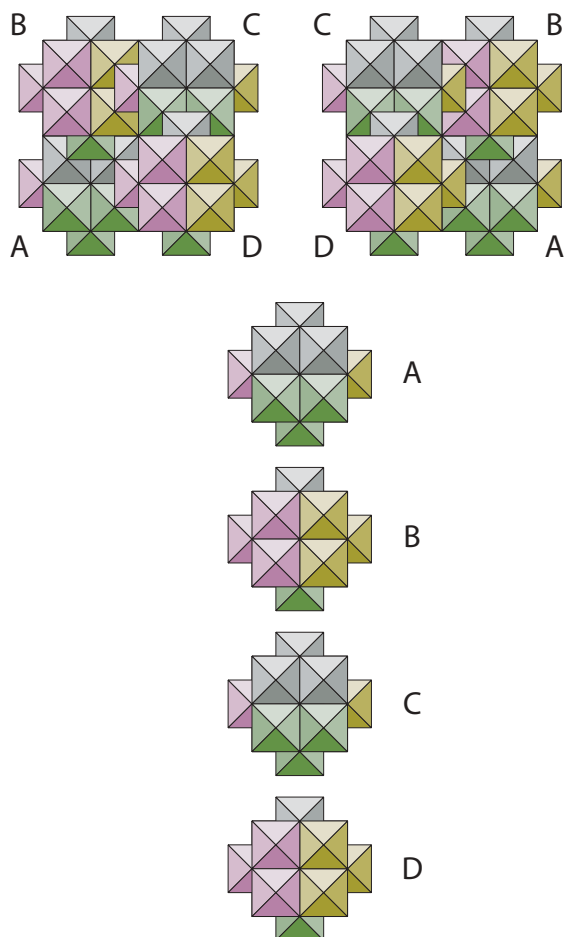


Fig. 4 Fourfold helical assemblies of diamond CFUs

The figure shows how four diamond CFUs can form a fourfold helical turn in either of two senses—clockwise towards the viewer or counter-clockwise towards the viewer. In each case, the CFU furthest from the viewer is labeled A and the CFU nearest to the viewer is labeled D.

The clockwise towards helical turn is on the left. The green C-atom of B joins with the gray C-atom of A; the violet C-atom of C joins with the yellow C-atom of B; the gray C-atom of D joins with the green C-atom of C.

The counter-clockwise towards helical turn is on the right. The green C-atom of B joins with the gray C-atom of A; the yellow C-atom of C joins with the violet C-atom of B; the gray C-atom of D joins with the green C-atom of C.

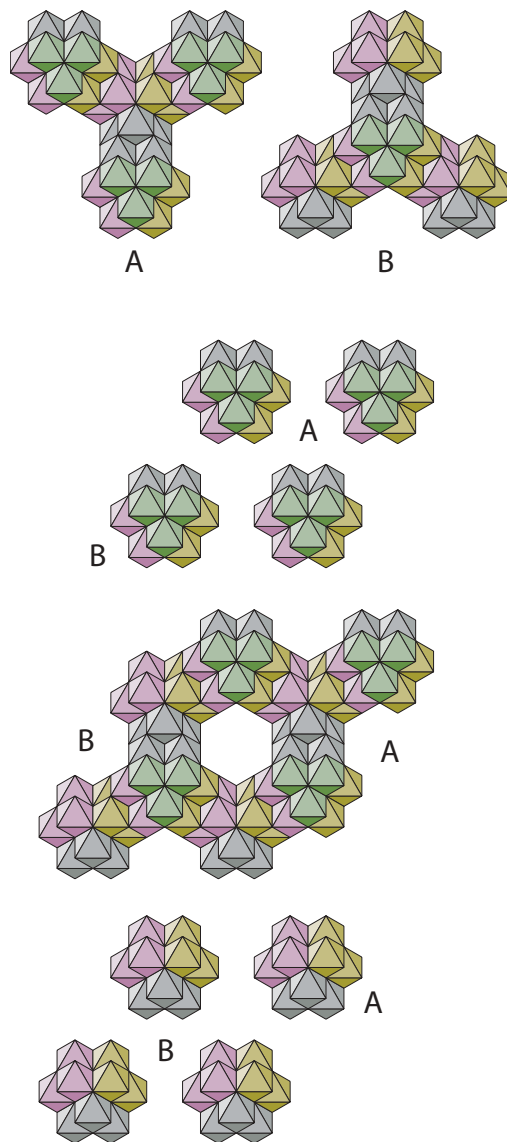


Fig. 5 Sheet join between two 2-triangles

The figure shows how two identical 2-triangles of diamond CFUs join to form a panel. Triangle A at the top left is inverted relative to triangle B at the top right. The two triangles are joined by two CFUs to form a ring in the middle of the lower part of the figure. The CFUs of the ring assembly lie on two planes. The CFUs of the plane nearer to the viewer are shown above the assembly. Each is oriented so that the green colored C-atom is visible. The three which belong to A are on the right and the one belonging to B is on the left. The CFUs of the plane further from the viewer are shown below the ring assembly. The three which belong to B are shown on the left and the one belonging to A is shown on the right.

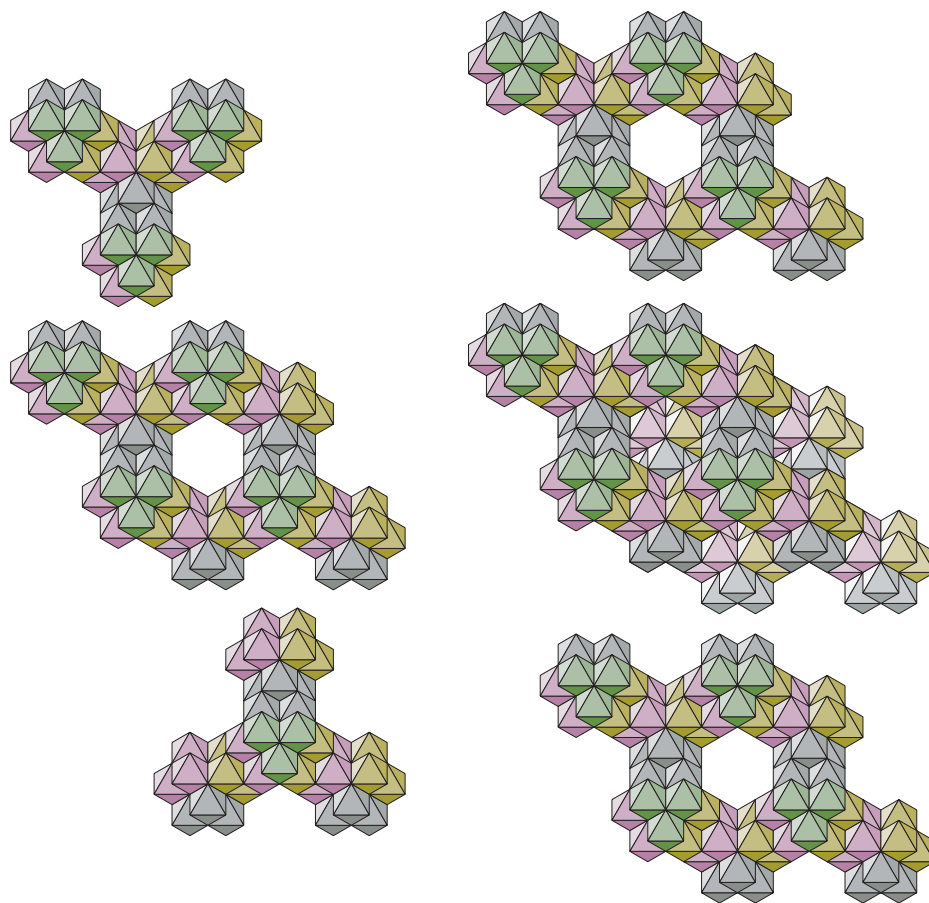


Fig. 6 Joining two identical sheet panels each consisting of two 2-triangles of diamond CFUs

The figure shows how 2-triangles of diamond CFUs form a bi-panel assembly. The ring assembly shown in the middle of the left column has each of its two 2-triangle components above it or below it. Two identical panels join to make the bi-panel assembly shown on the middle right. Each of the panels is shown separately either above it or below it.

Three CFUs of the rightmost 2-triangle of the top panel are joined to the lower panel. The rightmost CFU of the top panel is joined to the rightmost green-up CFU of the bottom panel. The other two green-down CFUs of the rightmost 2-triangle of the upper panel are joined to the two rightmost green-up CFUs of the left 2-triangle of the bottom panel.

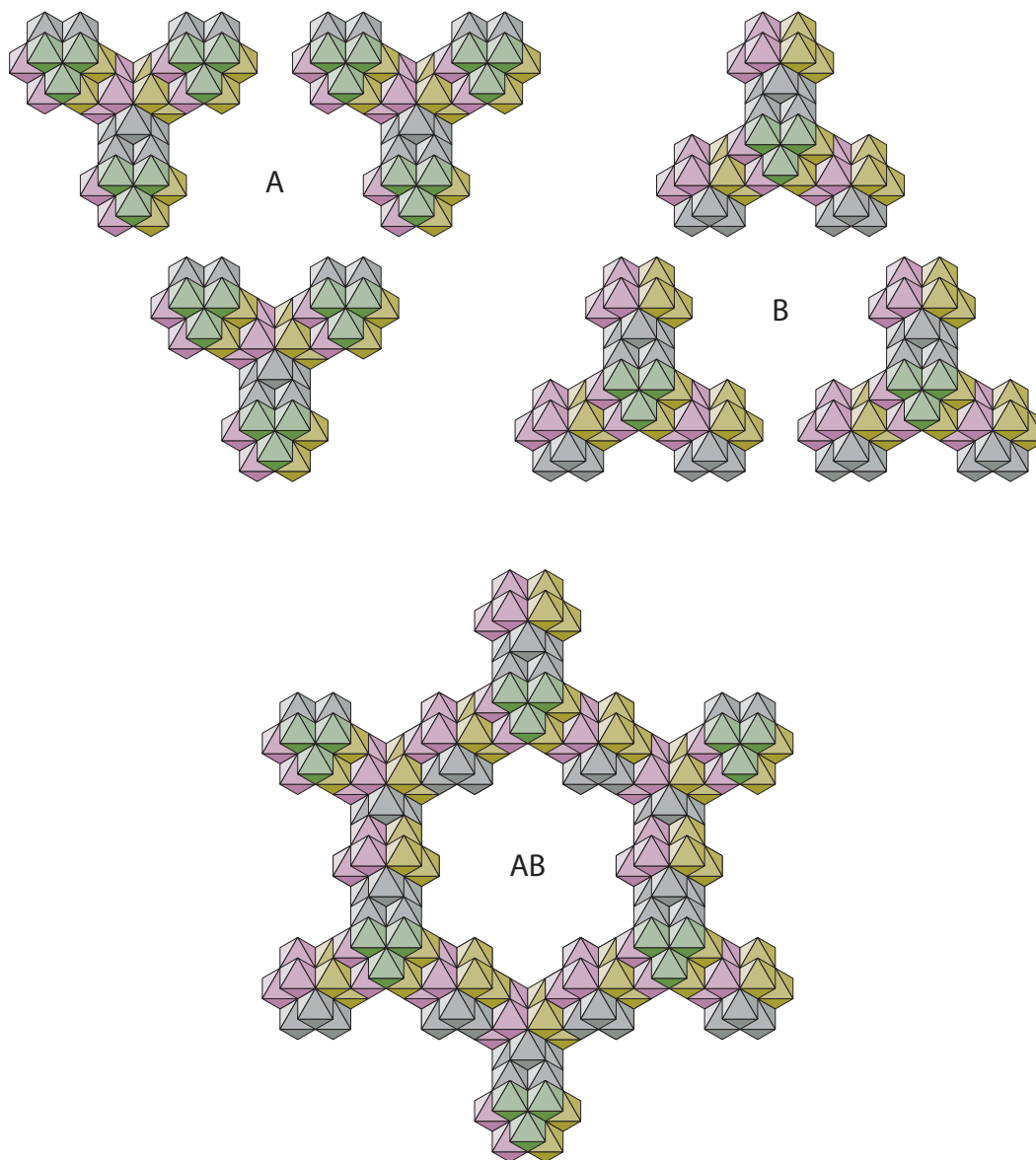


Fig. 7 Ring of six 2-triangles of diamond CFUs

The figure shows how six identical 2-triangles each consisting of four diamond CFUs join to form a hexagonal ring. The ring AB is shown at the bottom of the figure; its six components are shown at the top. The 2-triangles of group A differ from the 2-triangles of group B by one-half turn about the bottom edge of the page. The spatial relationship between the 2-triangles of each group is the same as their spatial relationship within the hexagonal assembly.

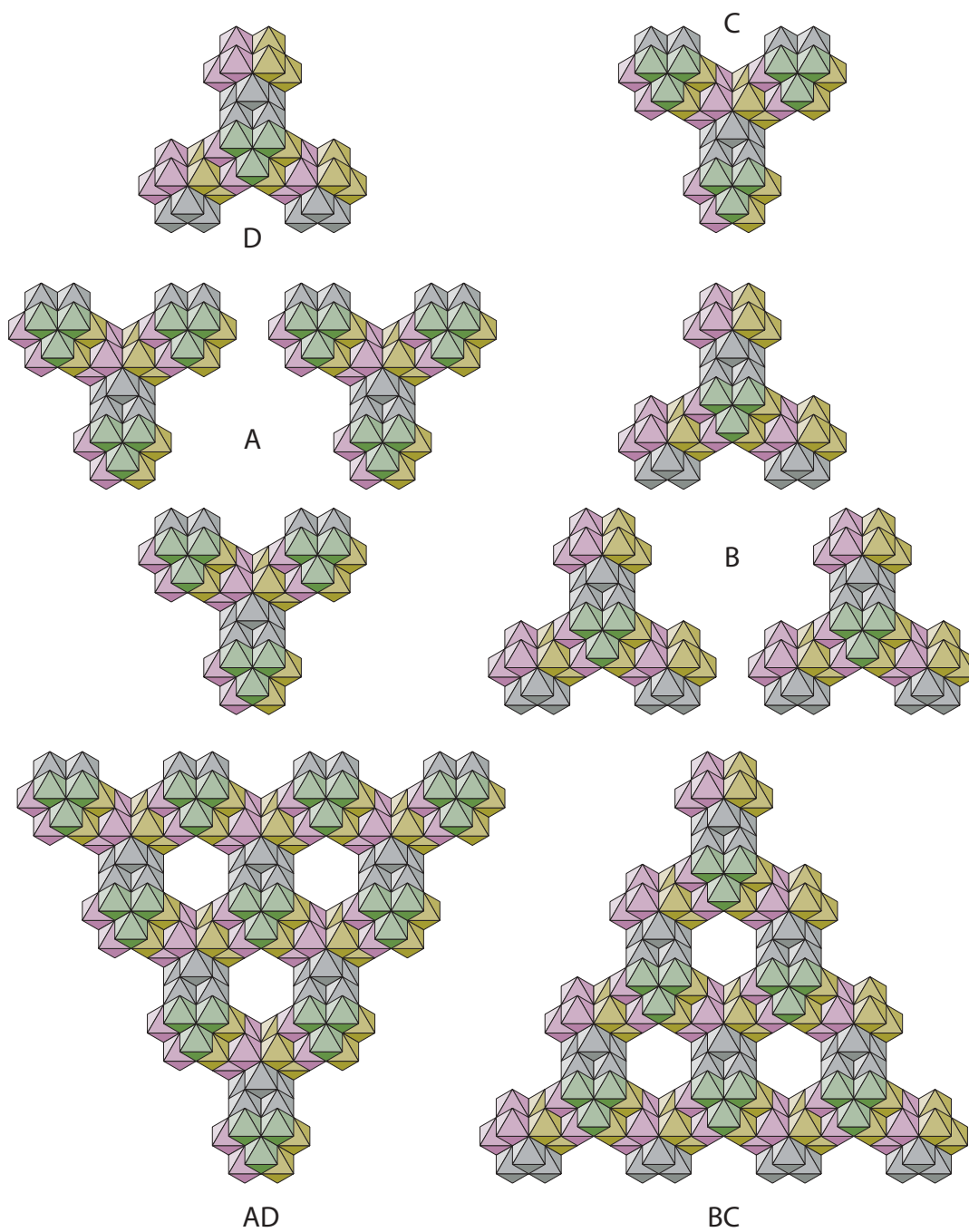


Fig. 8 Assembly of two 4-triangles by four 2-triangles of diamond CFUs

The 4-triangle AD at bottom left is formed by the three 2-triangles of A and the 2-triangle marked D. The 4-triangle BC at bottom right is formed by the three 2-triangles of B and the 2-triangle marked C.

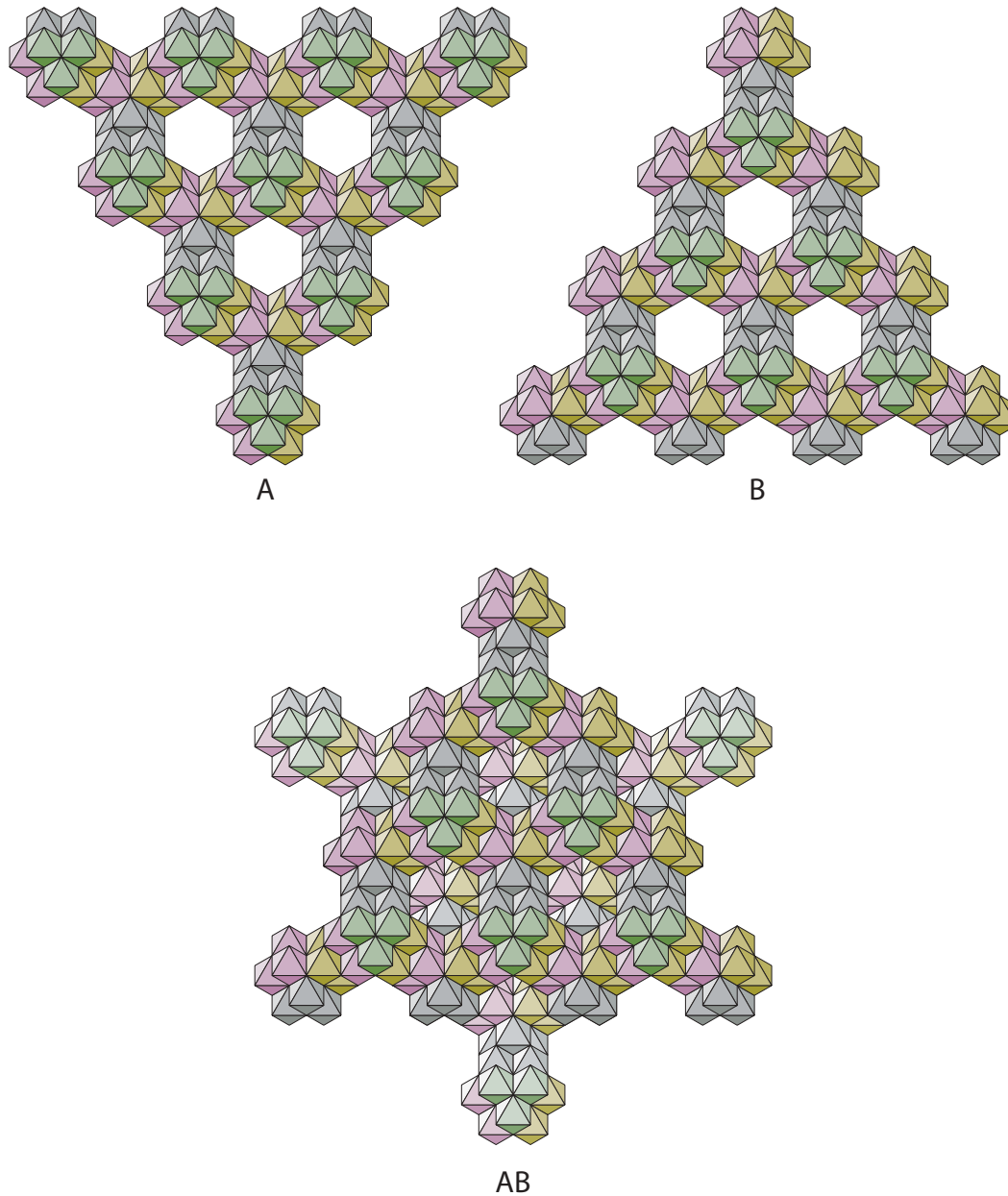


Fig. 9 Two panel assembly of identical 4-triangles of diamond CFUs

The figure shows how two 4-triangles of diamond CFUs join to make a symmetrical threefold assembly. At the top, panels A and B are identical 4-triangles which differ by one-half turn about the bottom edge of the page. At the bottom, panel B lies atop panel A. Each of the green-down CFUs of panel B, except for those at the three vertices, is joined to each of the green-up CFUs of panel A, except for those at the three vertices.