Octahedral assemblies of crystalline panels joined quasicrystallinely

Robert William Whitby
15 March 2006
http://homepage.mac.com/whitby/

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

Reference

1. Octahedron, the Universe defined by Robert William Whitby

A description of the atomic shapes and how they join which follows from the discovery that the periodicity of the atomic elements matches the periodicity of recurring form in which identical regular octahedra combine to form ever larger regular octahedra. Octahedron1stEd.pdf shows that the atomic elements are crystalline assemblies of identical regular octahedra and explores the implications of this discovery. 500 pages. See **Octahedron1stEd.pdf.**
http://homepage.mac.com/whitby/FileSharing103.html

2. Quasicrystalline octahedron by Robert William Whitby

The file QuasicryOcta.pdf shows how eight C-atoms each acting as a triangular panel can form a rigid regular octahedral quasicrystalline assembly.
http://homepage.mac.com/whitby/Quasicrystals/FileSharing69.html

3. Molecular building blocks approach to the assembly of zeolite-like metal–organic frameworks (ZMOFs) with extra-large cavities by Yunling Liua, Victor Ch. Kravstov, Randy Larsena, and Mohamed Eddaoudi

http://www.rsc.org/delivery/_ArticleLinking/DisplayHTMLArticleforfree.cfm?Journal-Code=CC&Year=2006&ManuscriptID=b600188m&Iss=Advance_Article

Introduction

The type of structure shown in Reference 3 suggests that zeolite structures are quasicrystalline.

The quasicrystalline octahedron composed of eight C-atoms each acting as a facial panel of Reference 2 can join with identical assemblies in the same manner as the forty-eight In-atom assembly of Reference 3 joins with its identical assemblies.

A forty-eight atom assembly can be composed of eight facial panels of six atoms each. Figure 1 shows an assembly of forty-eight C-atoms which is composed of eight C_6-rings. Figure 2 shows how two identical forty-eight C-atom assemblies can join in a manner that is similar to the In-atom assemblies of Reference 3. Figures 3 and 4 show two halves of an assembly of forty-eight SiO_2-groups. The halves are joined together in Figure 5.

A more open structure of the same type could result from the assembly of eight C_{36}-rings shown in Figures 6, 7, and 8. Figure 9 shows how two of these assemblies can join in the manner shown in Reference 3.

Figure 10 shows a ring of six Ca-atoms linked by C-atoms that is capable of making an eight ring assembly. Figure 11 shows an expanded ring of six Ca-atoms joined by C_3-strands that is also suitable for making a more open eight ring assembly.

Figure 13 shows a ring of six InN-groups linked by C-atoms capable of making an eight ring assembly. Figure 14 shows an expanded ring of six InN-groups linked by C_3-strands.

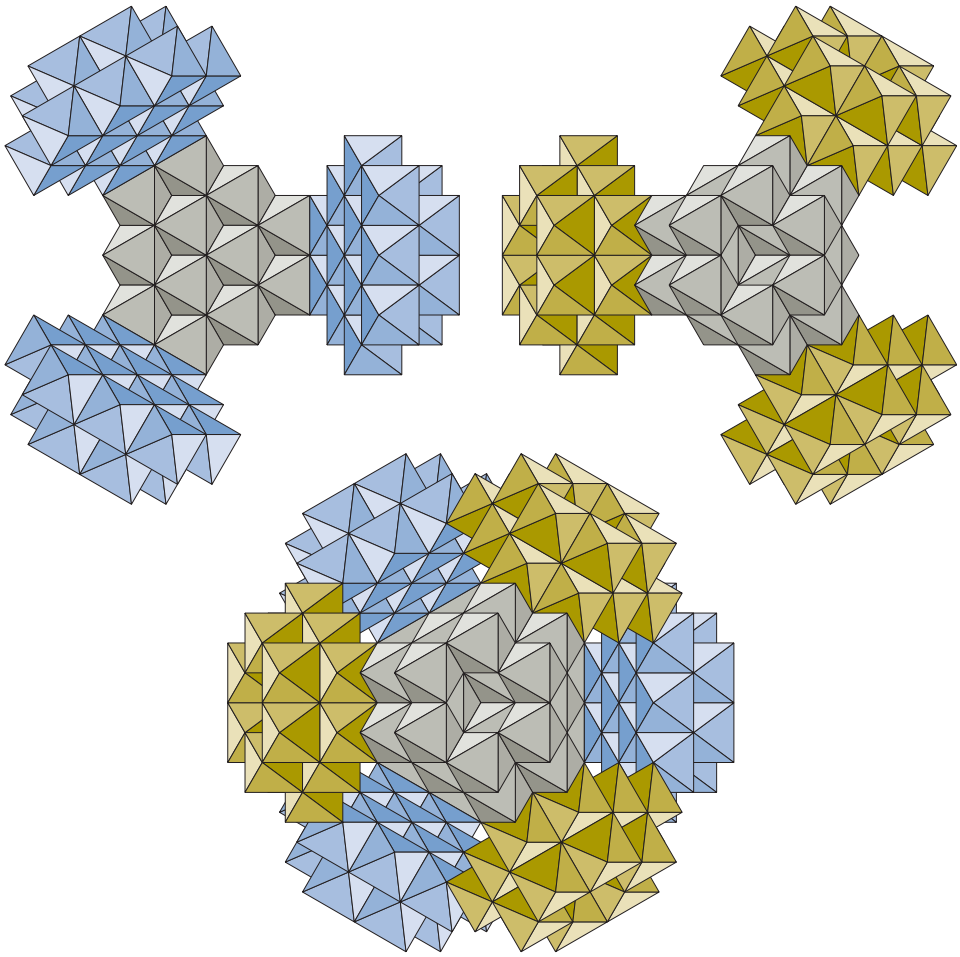

Fig. 1 Quasicrystalline assembly of eight C_6-rings

The figure shows a quasicrystalline assembly of eight C_6-rings. Each ring acts as a facial panel of a regular octahedron.

At top left, the gray ring with three hinge-joined blue rings constitute the bottom half of the assembly.

At top right, the gray ring with three hinge-joined yellow rings constitute the top half of the assembly.

At bottom, the complete assembly of eight hinge-joined C_6-rings each acting as the facial panel of a regular octahedral assembly is shown.

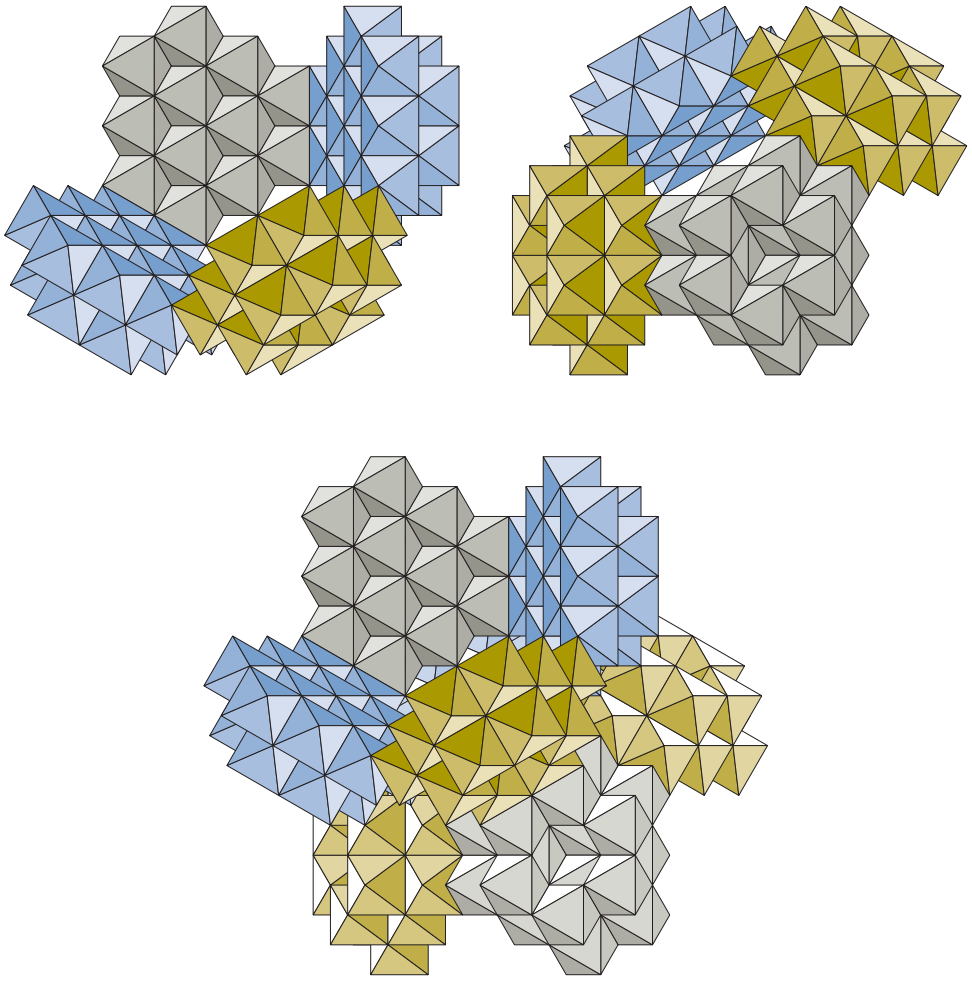

Fig. 2 Joining of two quasicrystalline assemblies of eight C_6-rings

The figure shows how two C_6-ring quasicrystalline octahedral assemblies can join so as to share a common fourfold axis.

At top left, four hinge-joined C_6-rings represent one half of an octahedral assembly.

At top right, four hinge-joined C_6-rings represent one half of a second octahedral assembly.

At bottom, the halves of two different assemblies are joined. Two He-octas of a C-atom of each of the four rings of each assembly is joined to two He-octas of a C-atom of a ring of the other assembly.

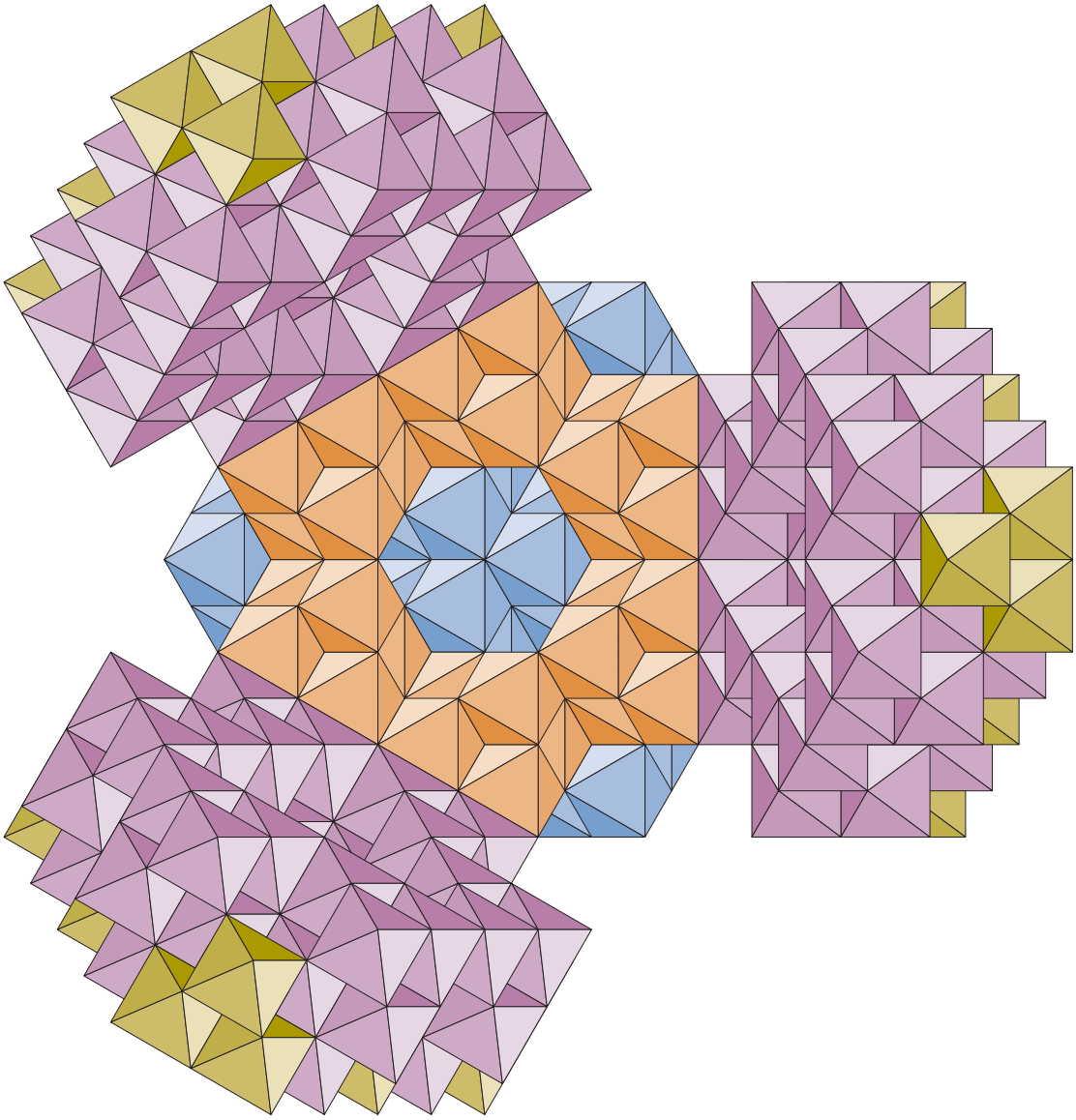

Fig. 3 Quasicrystalline assembly of eight 6SiO-rings–bottom

The figure shows the four lower hinge-joined panels of an eight panel quasicrystalline assembly. Each panel consists of six Si-atoms joined edge to edge and cleftly joined by an O-atom to each neighboring Si-atom. The Si-atoms of the bottom panel are colored orange and the O-atoms are colored blue.

The Si-atoms of the three adjoining panels are colored violet and their O-atoms are colored yellow. Each of two He-octas of two of the Si-atoms of each near panel shares an edge with a He-octa of a Si-atom of the bottom panel.

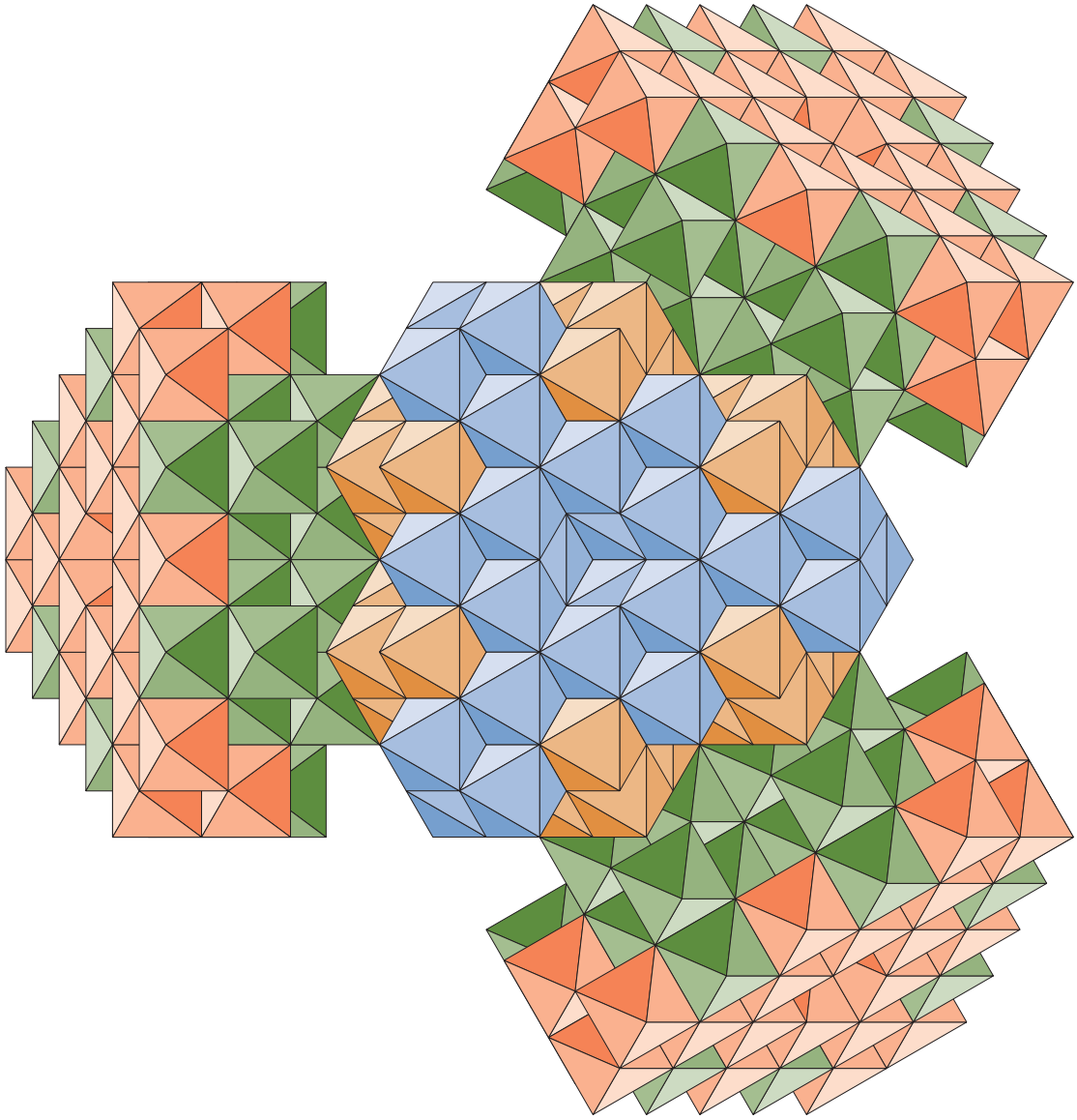

Fig. 4 Quasicrystalline assembly of eight 6SiO-rings–top

The figure shows the upper half of an eight panel assembly. Each panel consists of six Si-atoms cleftly joined by O-atoms. The Si-atoms of the top panel are colored orange, those of the adjoining panels are colored green. The O-atoms of the top panel are colored blue, those of the adjoining panels are colored red.

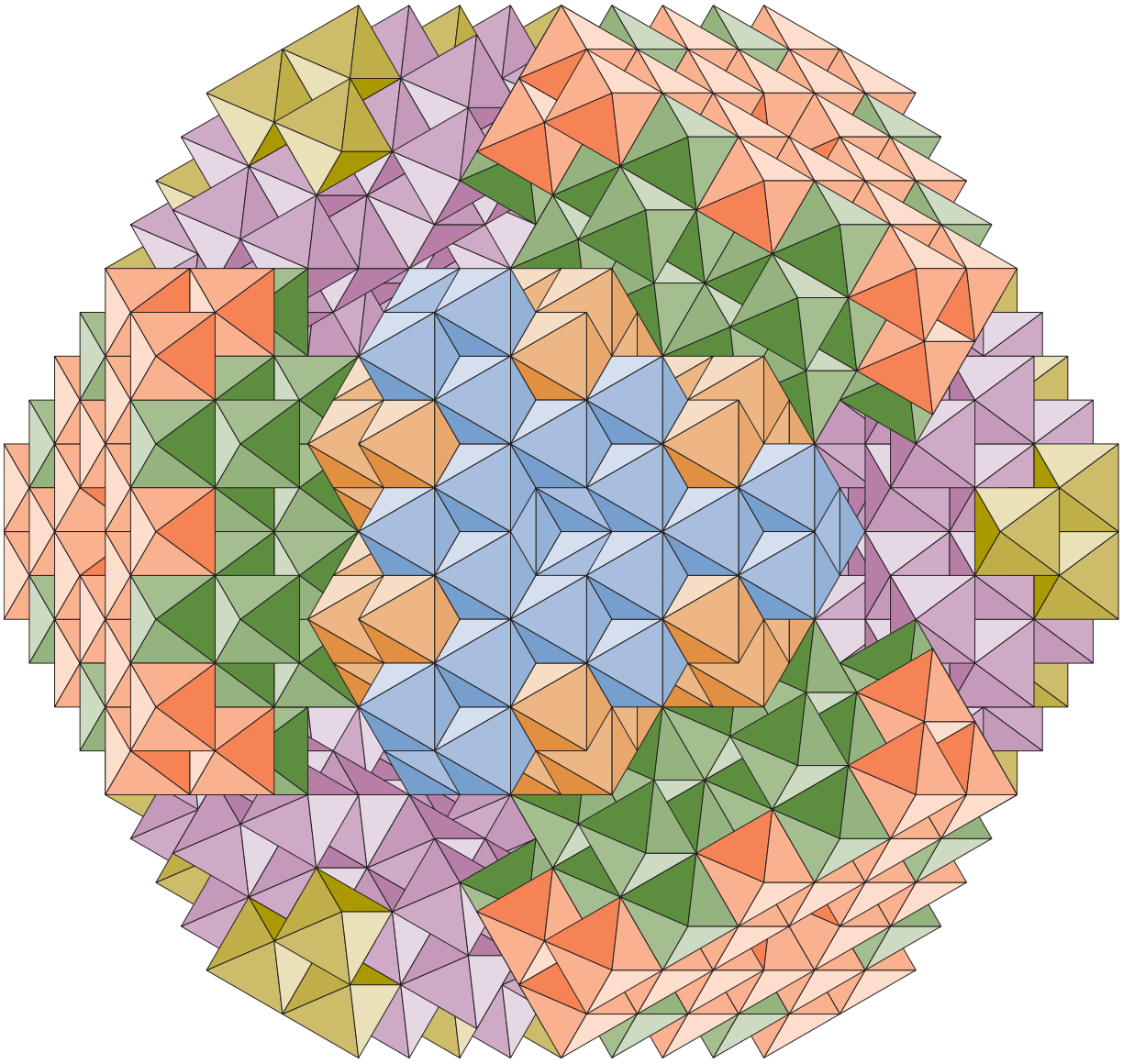

Fig. 5 Quasicrystalline assembly of eight 6SiO-rings

The figure shows the complete quasicrystalline assembly of eight 6SiO-panels. Each of the red/green panels of the upper half is hinge joined to two of the yellow/violet panels of the lower half. Each panel of the complete assembly is hinge-joined to three adjoining panels by the same edgial join of four He-octas.

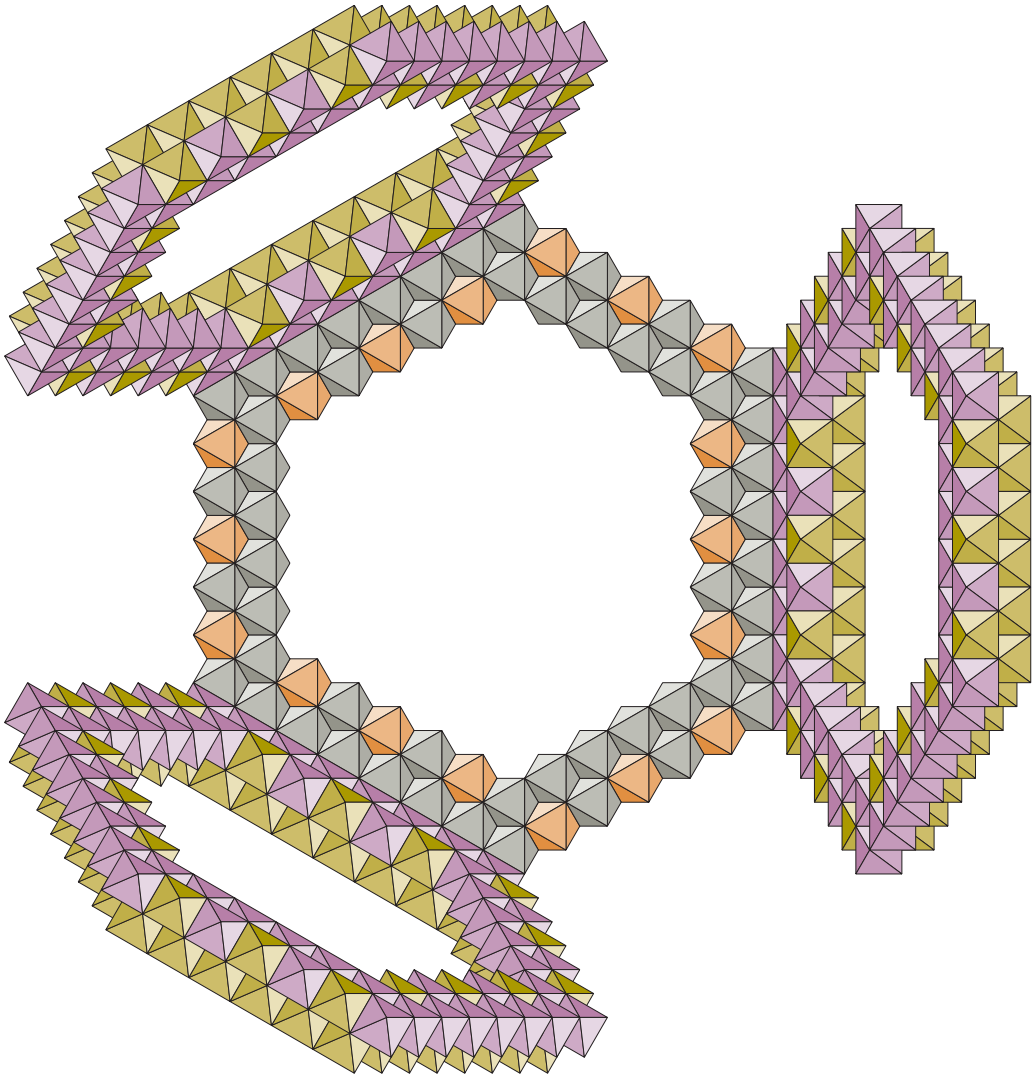

Fig. 6 Quasicrystalline assembly of C_{36}-rings–bottom

The figure shows four hinge-joined C_{36}-rings which constitute the lower half of a quasicrystalline assembly. Alternate C-atoms within each ring are the same color. The gray colored atoms are identically oriented while each of the orange colored atoms has one of three orientations. Each of the violet atoms within one of the nearer rings has the same orientation; the yellow atoms have one of three orientations.

Each of two He-octas of each of four violet C-atoms of each violet/yellow ring shares an edge with a He-octa of a gray C-atom of the gray-orange ring.

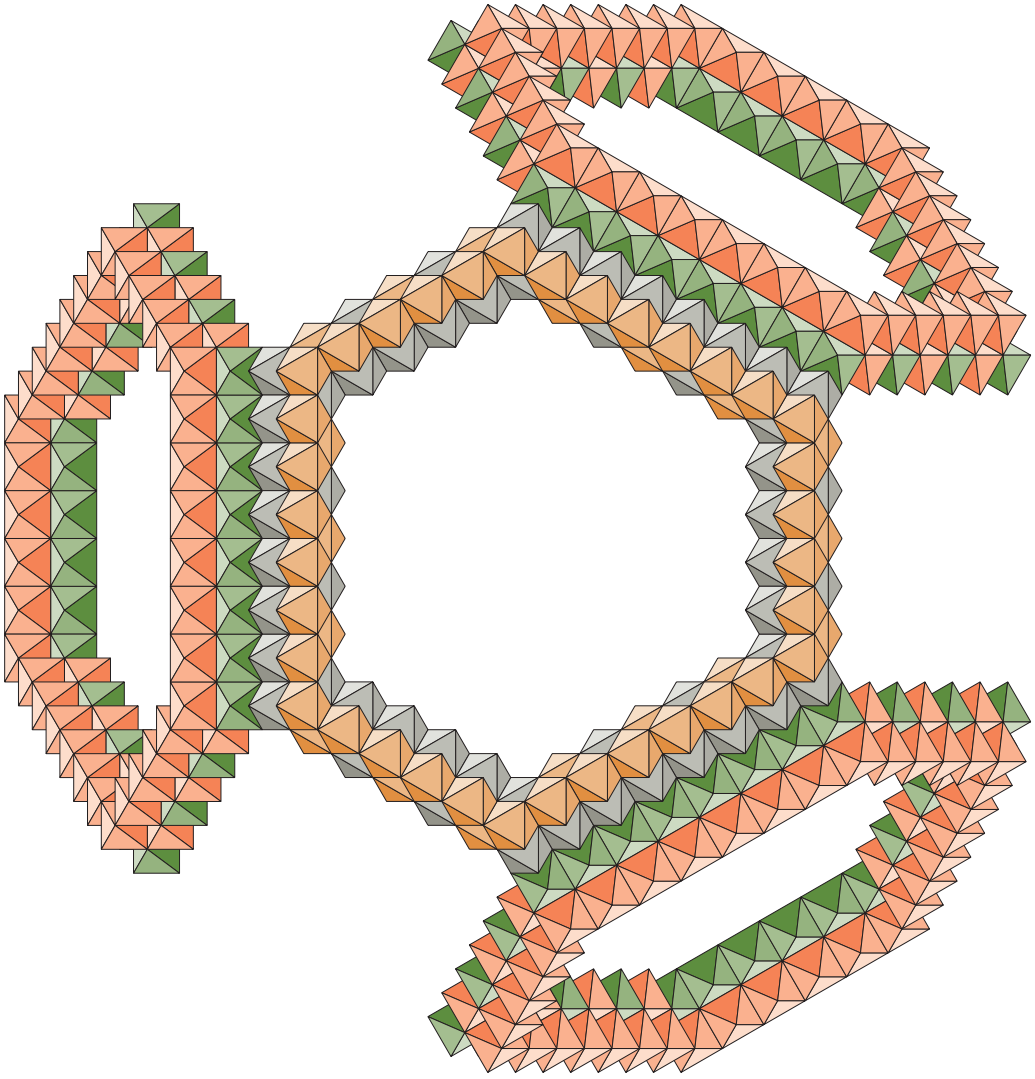

Fig. 7 Quasicrystalline assembly of eight C_{36}-rings–top

The figure shows four hinge-joined rings of thirty-six C-atoms each. Alternate C-atoms within each ring are the same color. Each gray C-atom of the gray/orange ring has the same orientation as do the green atoms within each of the red/green ring. The other C-atoms within each ring are in one of three orientations. The join between the gray/orange ring and each of the red/green rings is between eight gray He-octas and eight green He-octas.

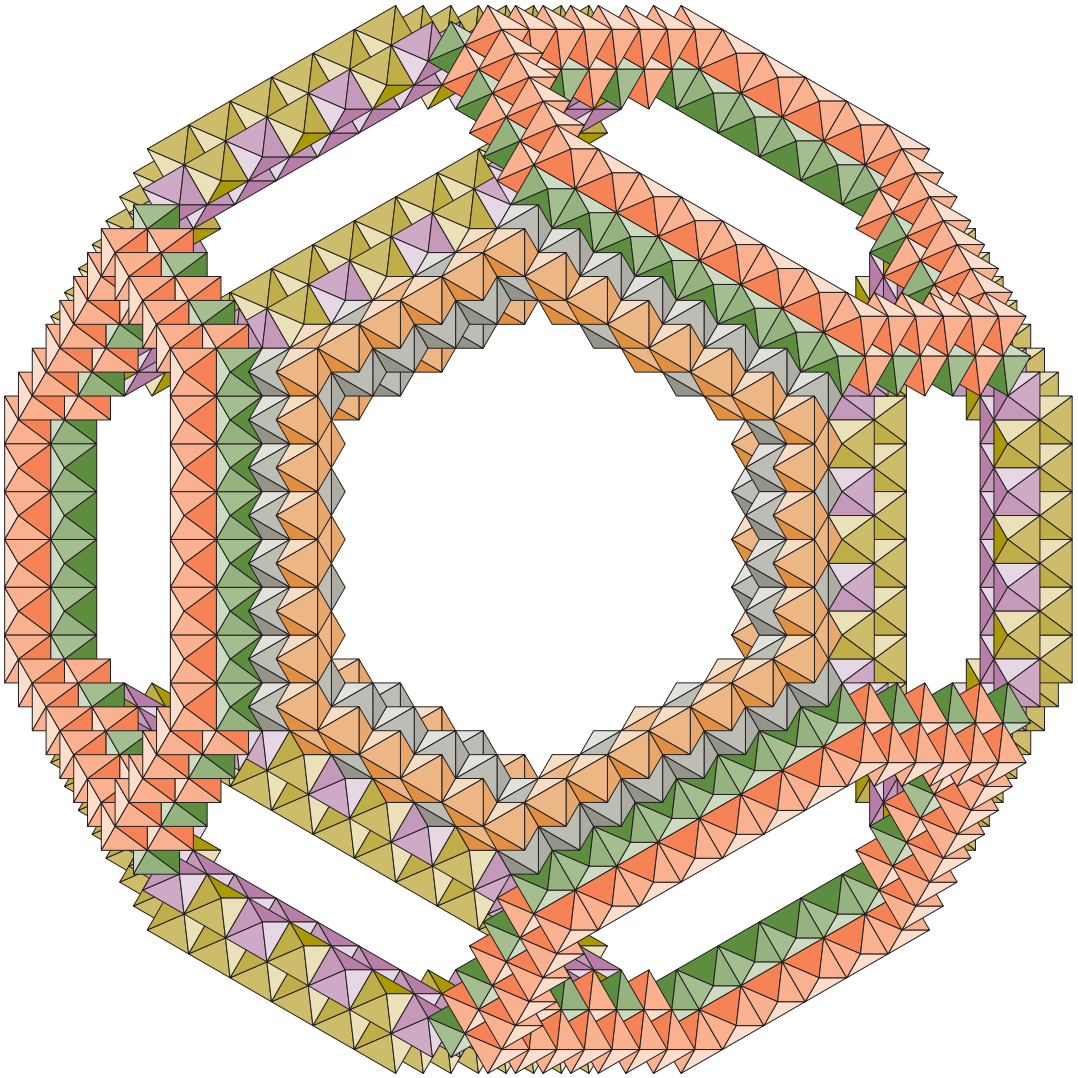

Fig. 8 Quasicrystalline assembly of eight C_{36}-rings

The figure shows a quasicrystalline assembly of eight hexagonal rings of thirty-six C-atom each. Each ring is hinge-joined to each of three other rings. Each hinge-join is between eight He-octas of each of two rings.

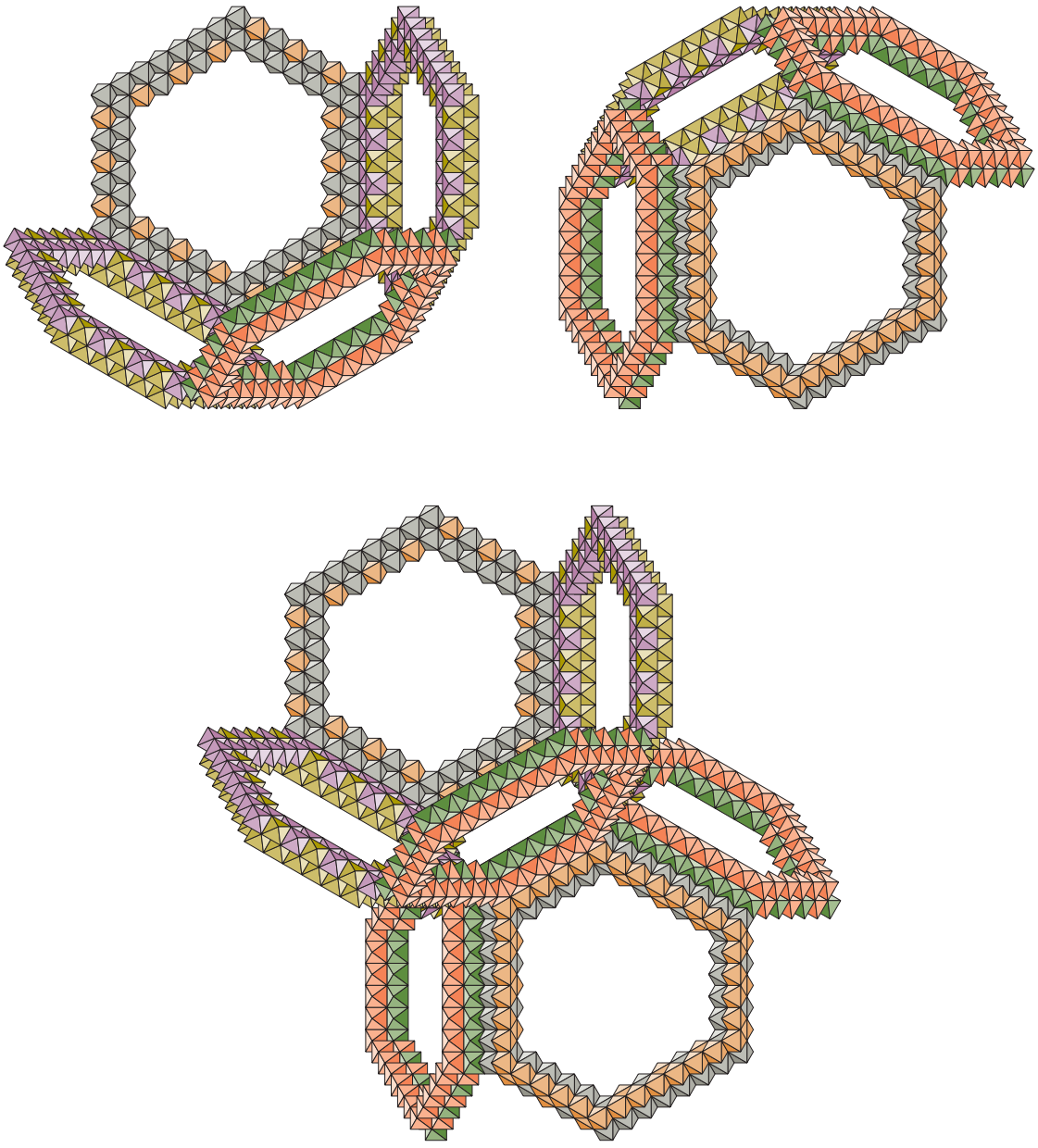

Fig. 9 Joining of two quasicrystalline assemblies of eight C_{36}-rings

The figure shows the joining of two identical quasicrystalline assemblies of eight hexagonal panels of thirty-six C-atoms each. In the upper left, one assembly is represented by four of its eight rings. In the upper right, the second assembly is similarly represented. At bottom, the portions of the two assemblies are joined. Each ring of one assembly is joined to a ring of the other assembly by six He-octa edges–two He-octa edges per C-atom, three C-atoms. The join between the red/green ring of the upper left assembly and the gray/orange ring of the lower right assembly is between an edge of each of six red He-octas and an edge of each of six orange He-octas.

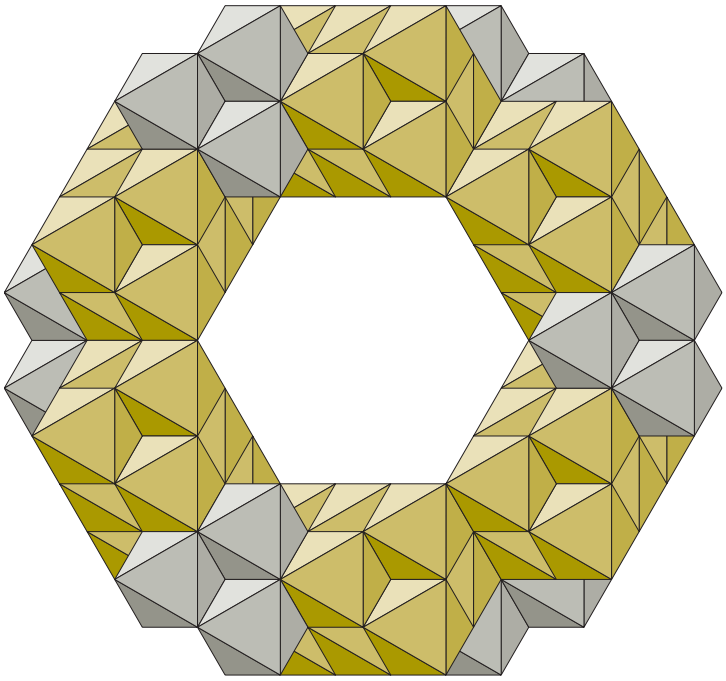

Fig. 10 Ring of six Ca-atoms cleftly joined by C-atoms

The figure shows a ring of six Ca-atoms colored yellow cleftly joined by C-atoms colored gray. Each Ca-atom is also hinge joined by two He-octa edges to each of its neighboring Ca-atoms.

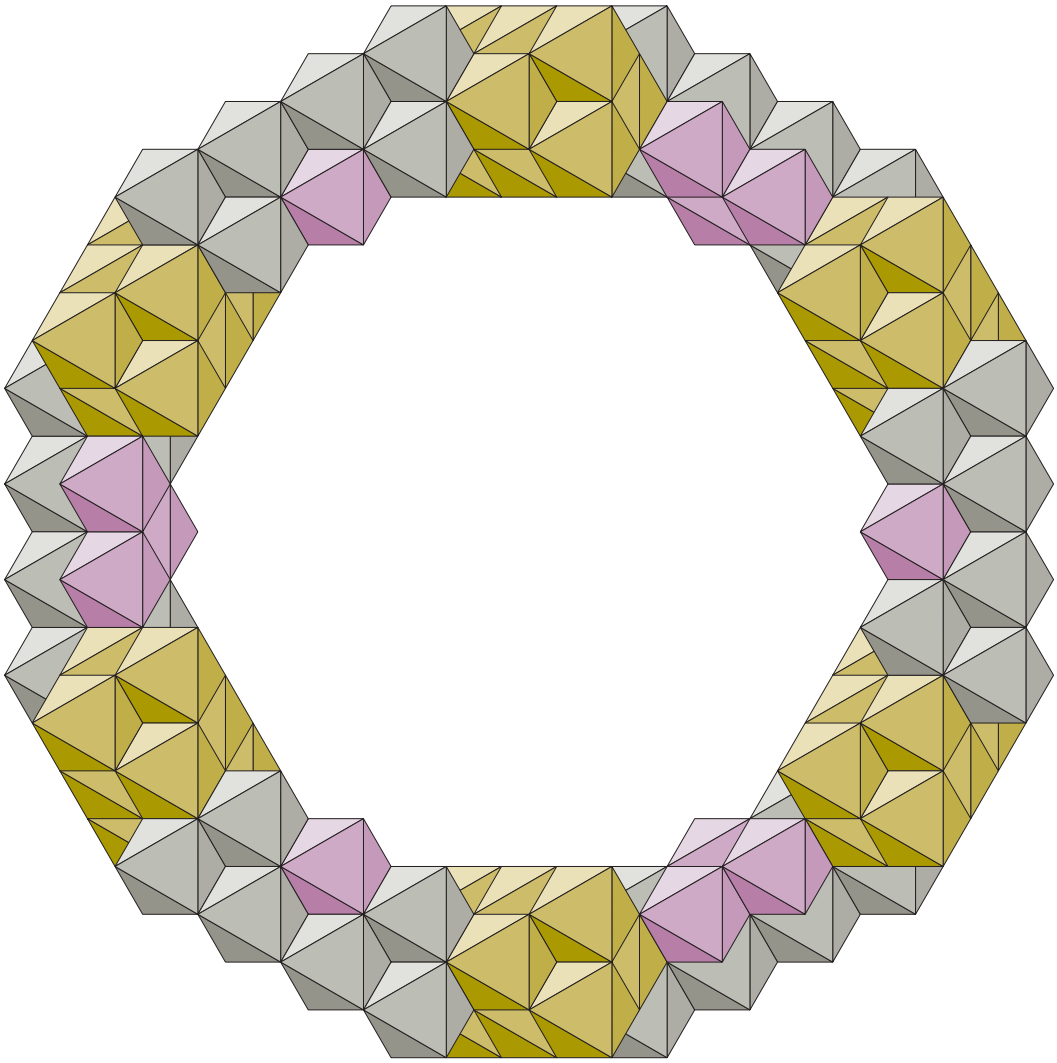

Fig. 11 Ring of six Ca-atoms cleftly joined by C_3-chains

The figure shows six yellow Ca-atoms joined in a ring by C_3-chains. Each gray C-atom is cleftly joined to both a Ca-atom and a violet C-atom.

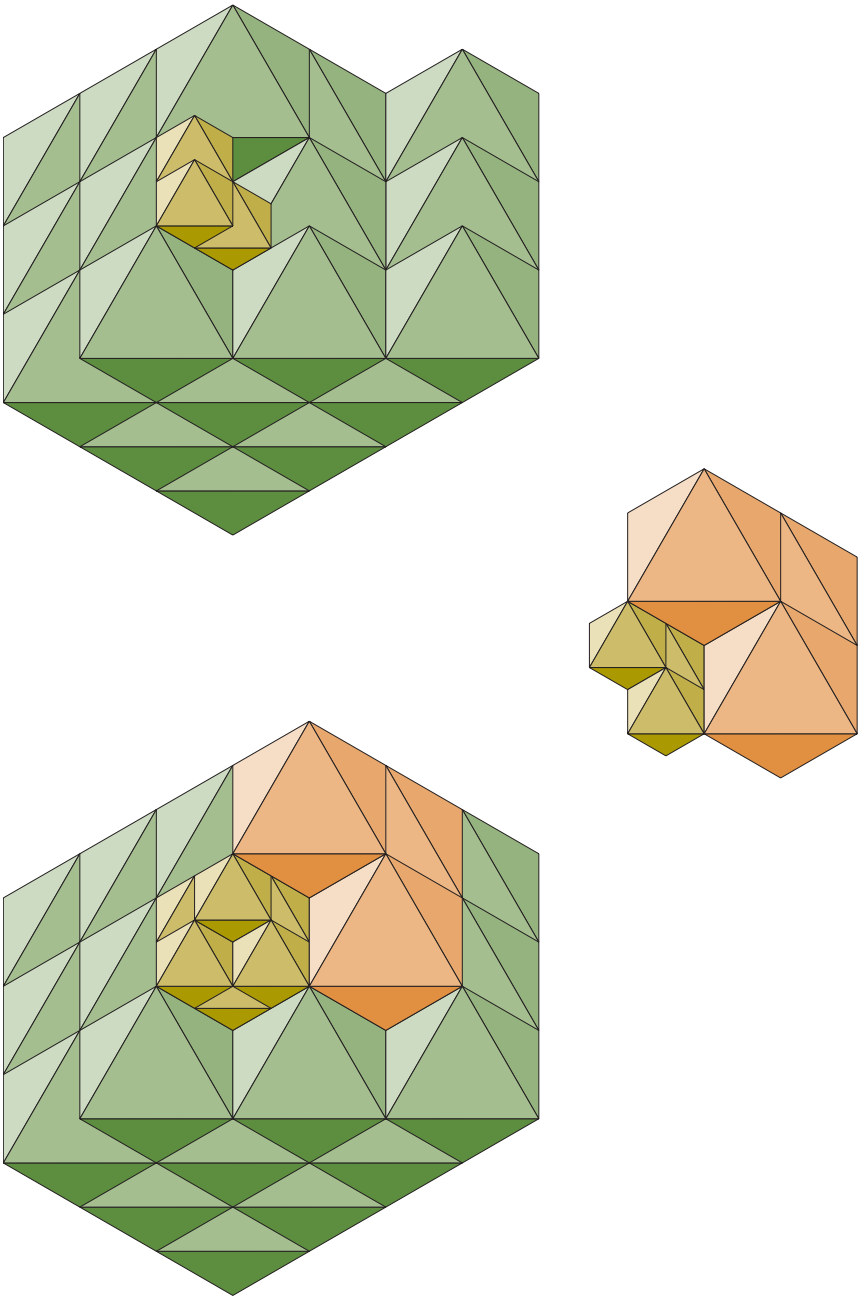

Fig. 12 InN-group–facial view

The figure shows the formation of an InN-group which is a homomorph of the Ba-atom. The In-atom is shown at the top, the N-atom in the middle, and the InN-group at the bottom. The epn-triplets of the two atoms are shown in yellow.

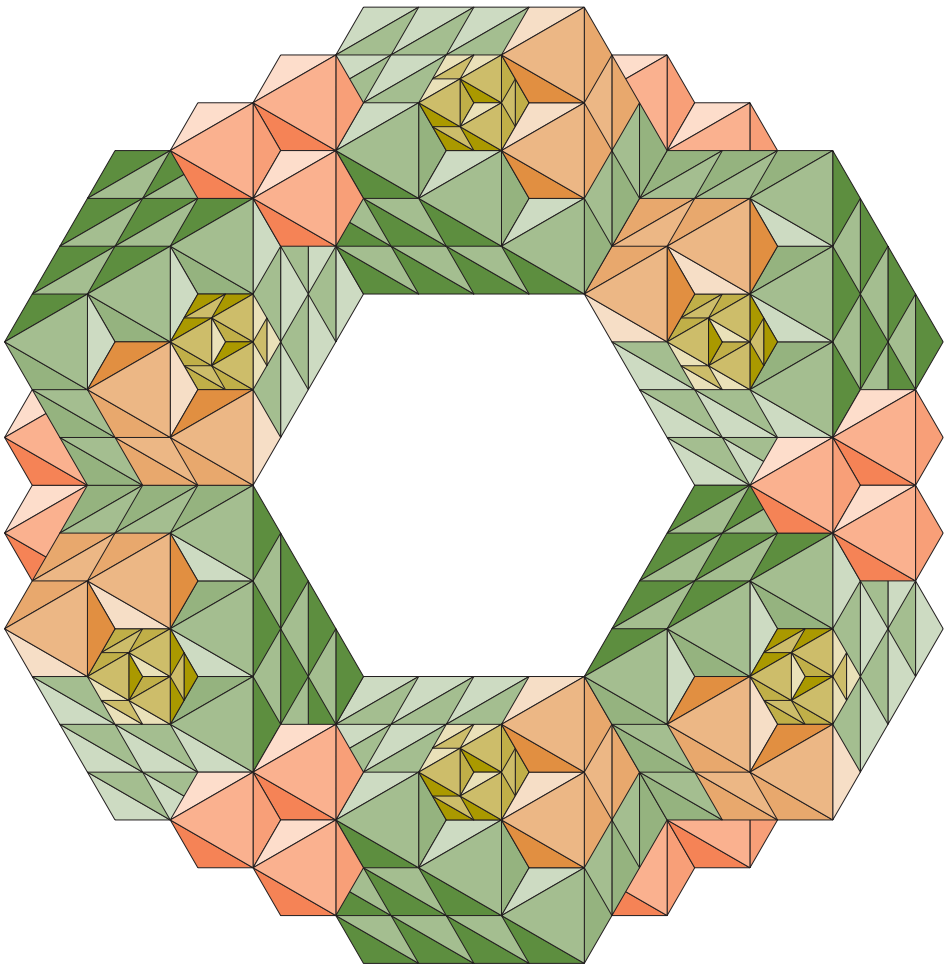

Fig. 13 Ring of six InN-groups joined along a three He-octa edge with cleftly joined C-atoms

The figure shows a ring consisting of six InN groups (In-atom He-octas colored green, N-atom He-octas colored orange and the joined triplets colored yellow) and six C-atoms colored red. Each InN-group is joined to each of its two neighboring InN-groups by a hinge join of three He-octas. A C-atom cleftly joins each In-atom to each of its neighbors.

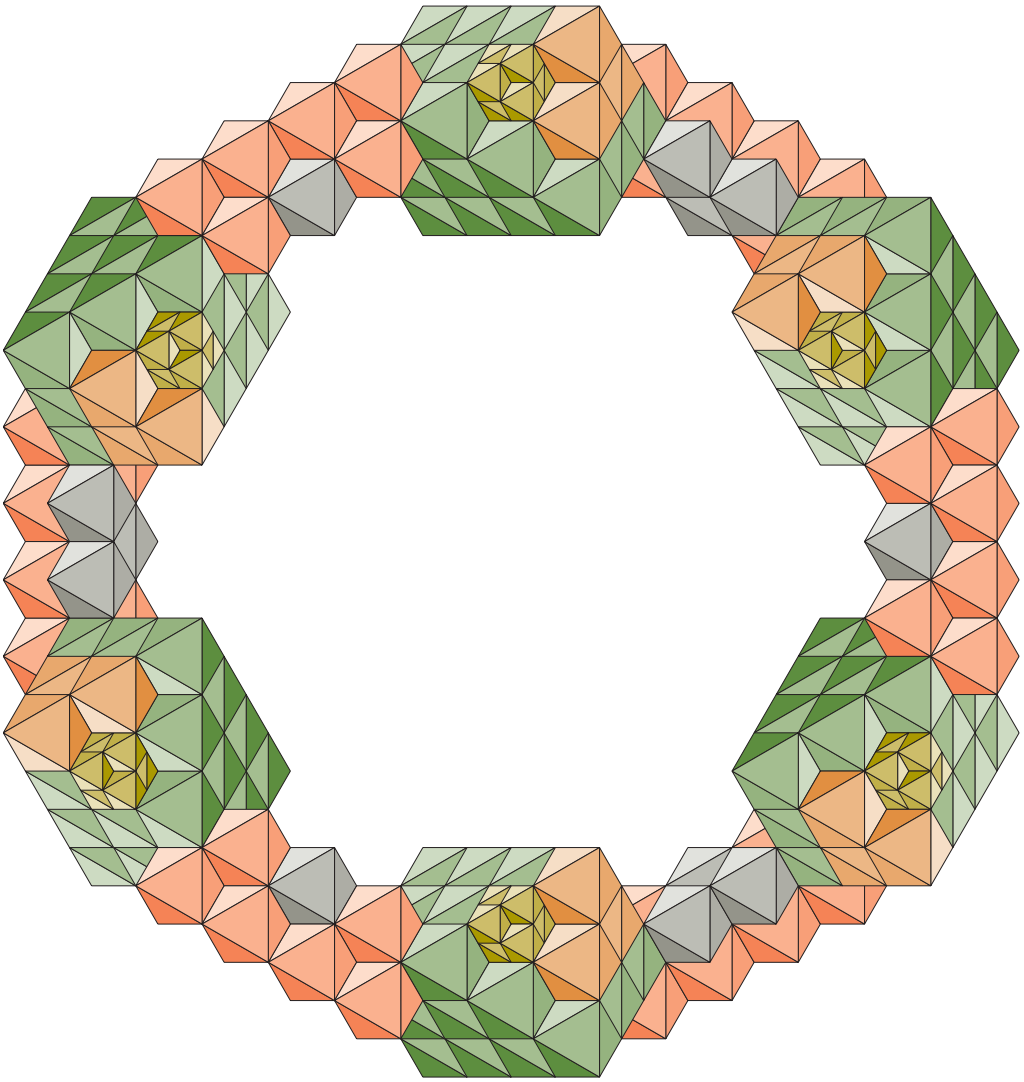

Fig. 14 Ring of six InN-groups cleftly joined by C_3-chains

The figure shows a ring of six InN-groups linked by C_3-chains. The In-atoms are colored green, the N-atoms are colored orange, and their combined triplets are colored yellow. The red C-atoms are cleftly joined to the In-atoms; the gray C-atom links the two red C-atoms of each C_3-chain.

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