Spring 2025

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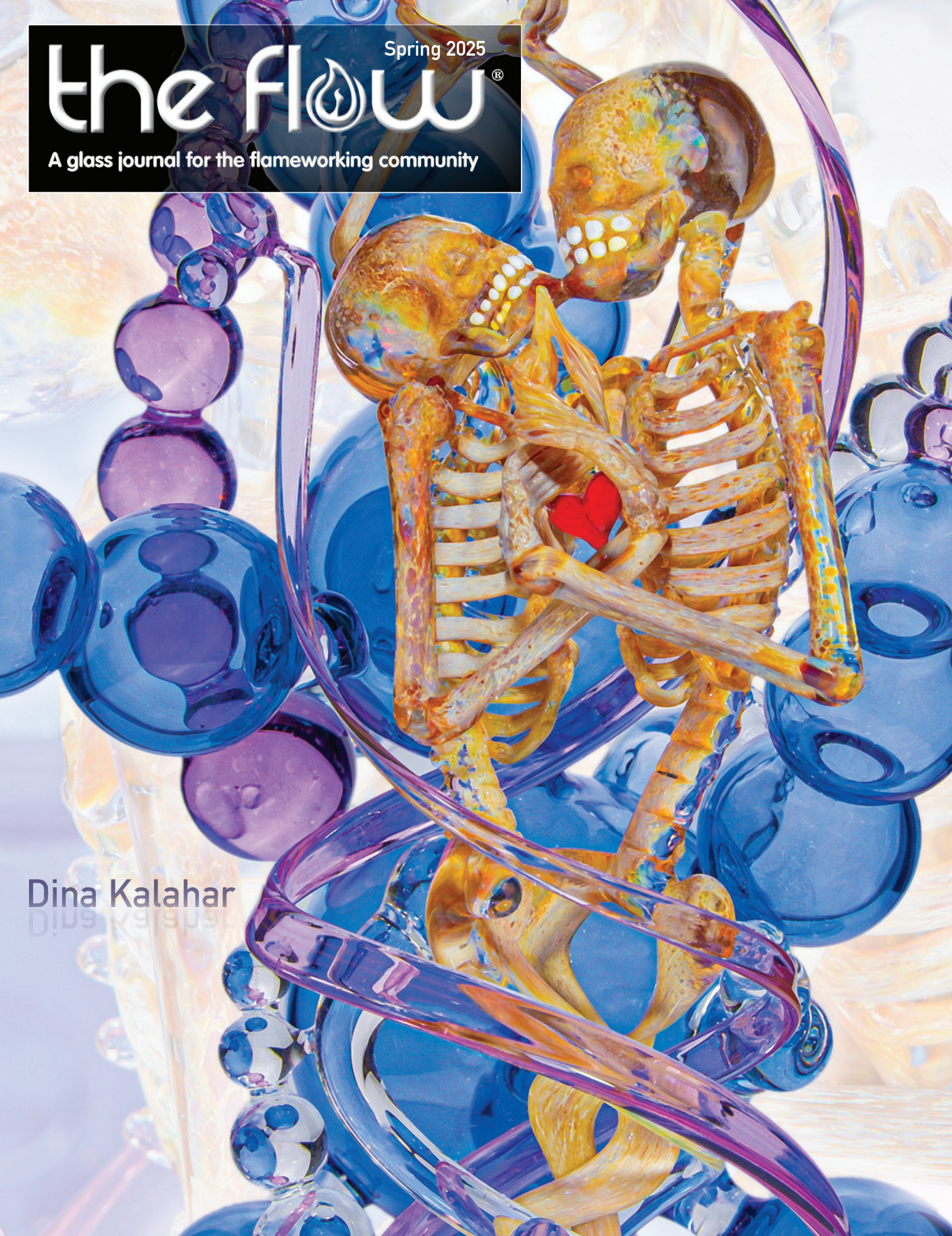
A glass journal for the flameworking community



Dina Kalahar

Sunday Morning Glass School Suncatcher

by Terry Henry
Photos courtesy of the artist

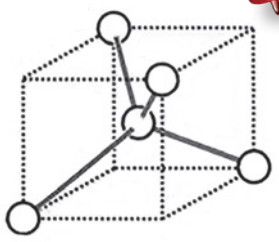


Figure 1
Crystal structure of silicona

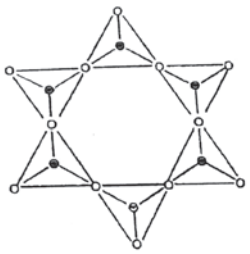


Figure 2
Ring silicate

Sunday Morning Glass School with Dr. Julie Denton is always an exciting experience with great speakers and several personal challenges. These usually include a master glass artist who provides a demonstration to the students, who then spend the week following the demonstrations applying the Sunday Morning lesson. The objective is to meet a new artist, learn new techniques, and apply them. We were assigned an individual challenge in one session. Dr. Julie presented a unit on suncatchers. Her suncatchers were comprised of disks and posts assembled into "constellations" that could be fit together to make a more complex shape or be used individually. The class assignment was to create a suncatcher of our choice. Components that fit together would add extra complexity to the challenge. This is the story of how I worked through the challenges of my selected project.

When challenged with the individual assignment, the first thing that came to my mind was the silica tetrahedron. My scientific background and train of thought rose to the challenge and left the station long before my artistic creativity and reality caught up. Eventually my artistic voice and skill surfaced. I created a suncatcher which is an interpretation of a single silica crystalline tetrahedron and a variation of the ring silicate structure. However, before this occurred, I had numerous failures and design changes. Before I get into what was actually made, let me share why the idea of using the silica tetrahedron for this assignment excited me.

Silica Crystalline Structure
The Silica Tetrahedron

The scientific part of my brain went through a whole series of reasons why the tetrahedron was absolutely perfect for this assignment: The silica tetrahedron forms the crystalline structure of the largest group of minerals on earth. It is estimated that 90% of the earth's crust is made up of silicate-based materials. This basic form is everywhere, even in the glass we use! Silica and oxygen are the two most abundant materials on earth. The framework for the silica tetrahedron repeats itself over and over and over in many different arrangements to make different minerals. How cool is that?

Single tetrahedrons make up the crystal arrangement of atoms in olivine, commonly known as the gemstone peridot. Double silicate tetrahedrons are part of the crystal lattice for epidote, while ring silicates make up the arrangement of atoms for beryl known as aquamarine and emerald as well as tourmaline. There are double chains of silica tetrahedrons, single chains, and more. There are seven major silicate groups with numerous minerals. Talk about repetition of a shape. Silica tetrahedrons are everywhere.

The silica tetrahedron molecule is made up of one oxygen atom surrounded by four silica atoms. The tetrahedron fits nicely in a cube with silica atoms occupying opposite corners of a cube. Figure 1 shows this configuration. This just had to be the perfect subject matter for application of the challenge until I started to make and try to assemble the units.

Initial Problems

My first attempt to create a glass structure of atoms making up a silica tetrahedron is shown in photo 2 on the next page. Actually, the structure inside the cube is what I was trying to make, and once this shape was conquered, I was going to make a more complex structure with six ball-and-rod arrangements. However, it turns out that to connect these structures the rods between the atoms need to be the same length, the balls should be the same size, the angles between the oxygen and silica atoms need to be just right (109.5°), and the angle between each silica atom needs to be correct too (120°). Otherwise, they don't fit together. Again, my goal was to create six silica molecules so I could create a ring silicate like the assembly shown in figure 2.

Just a note about the suncatcher in photo 2. I had attempted cubes numerous times, trying to recreate figure 1, and had a few cubes lying around on the worktable. Thankfully, my creative side intervened and suggested I put something together, so I put two cubes and my best silica tetrahedron together in this cosmic, atomic-like shape. While the shape isn't where I wanted to go, it does represent progress, and the silica atoms are nicely placed in the opposite corners of the cube. Furthermore, the structure does make a nice, although wonky, suncatcher.

At Dr. Julie's suggestion, I made a model. I used Styrofoam balls and toothpicks. This exercise provided an understanding of general construction and how atoms needed to be arranged. It also confirmed the need to have the angles correct. So, I made six single tetrahedrons out of glass, like the one in photo 1. I grouped these structures into three sets of two tetrahedrons and started to assemble the glass components into a ring structure. I was unsuccessful, especially after dropping the structures multiple times trying to get the correct angles and trying to align the atoms. I was being way too literal. I was still trying to make a structure using balls and posts. I needed to come up with a better plan.

I studied figures on the internet. The answer was staring at me the entire time. I realized all I needed to do was to build tetrahedrons. As long as the rods making up the tetrahedrons were the same length, the structure would be symmetrical and the angles would be perfect. And now I had created interchangeable repeatable forms meeting the challenge criteria. In fact, I now had two interchangeable repeatable forms, an equilateral triangle and a tetrahedron! An equilateral triangle is a triangle that has all three sides the same length and all three angles the same (60°). A tetrahedron is made up of triangles and has a pyramid-like shape with four sides and four equilateral triangles.

Photo 2
Tetrahedron in a cube

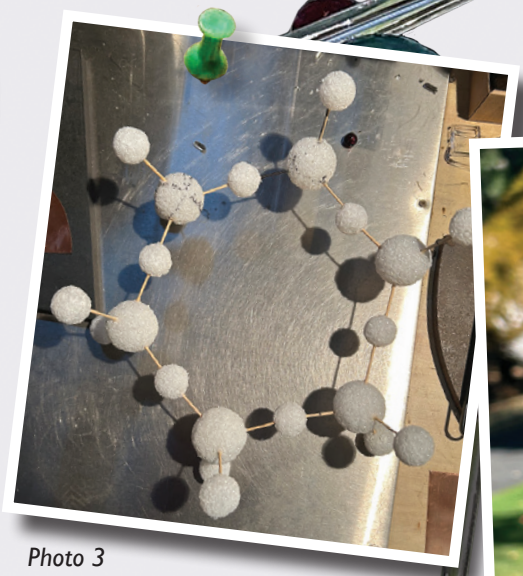


Photo 3
Stryofoam model

Photo 1
Single tetrahedron

Photo 4
Cyclocate with hanger

Finally!

From the Styrofoam ring silicate model, I knew each silica tetrahedron shared a red ball, the silica atom, and the other two red balls were on the nonshared corners. The oxygen atom, a blue ball, was located roughly in the center of the pyramid. I used a rod to attach the oxygen atom to a corner and centered it as much as possible. The final and successful assembly of the *Silica Ring Suncatcher* is shown in photo 4. Now I had to figure out how to hang this thing.

I am most proud of the hanging assembly which is visible in photo 4. I didn't want to hang the structure from a tip of a tetrahedron because it looked like a Star of David, which was not the look I was going for. I wanted to hang it from the base of two adjacent tetrahedrons. I built two more equilateral triangles and placed two hooks on their bases. I made a loop on the tip of each triangle. The loops of the triangle assembly were placed side-by-side. I was worried about loops rubbing together and added a plastic spacer between them. Plastic tubing was threaded through the hole in each loop and the hanging wire threaded through the tube. My husband came up with the fabulous idea of using fishing line swivels to let the suncatcher turn freely in the wind and keep the suncatchers from getting twisted.

I had successfully assembled and hung a suncatcher that is an interpretation of a ring silicate composed of six silica tetrahedrons. I now had to go back to square one and make a single tetrahedron showing the relationship of oxygen and the silica molecule in a single unit cell.

This exercise has been very successful and rewarding. Thank you, Dr. Julie, for the opportunity to expand beyond my boundaries, challenge myself, and learn so much in the process. Sunday Morning Glass School is offered through Zurich Glass School.

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https://www.zurichglassschool.com/

After a 34-year career as an earth scientist and teacher, it is not surprising that my style embraces and celebrates "The Science of Art." My creativity is guided by elements of the chemical, physical, and natural world that I have explored as an artist and scientist. I delight in understanding scientific processes of glass, organic elements, metal, and electricity, which provide a platform for artistic growth, development, and increased confidence. Elements of my work represent science while my palette of color, form, and design embraces a whimsical natural world with fantasy that often challenges the boundaries of reality. The science of art continues to inspire my work and the way I think about the materials I use. To find out more about me and my classes, please visit www.terry-henry-glassworks.com.