Lucem Ferre



By

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Submitted to the graduate degree program in the Department of Visual Art and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirement for the degree of Master of Fine Arts.

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The Thesis Committee for Lopeeta Sudhakar Tawde certifies that this is the approved version of the following thesis:

Lucem Ferre

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Chairperson Gina Westergard

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**Abstract**

Lucem Ferre, a Master of Fine Arts thesis exhibition was influenced by an interpretation of bioluminescence, a chemical process in which a living organism catalyzes and releases light from within; this process is also effected by microorganisms living symbiotically within host animal and plant bodies. It is primarily observed in deep-sea marine as well as in terrestrial life. Bioluminescent life forms embody dualities; they are luminous and subdued, beautiful and repulsive, still and active. I use non-traditional materials, silicone, phosphorescent pigments and ultraviolet light, to create a jewelry collection of "wearable creatures" inhabiting an enigmatic and unworldly gallery environment. This 15-piece collection includes brooches, rings, armbands and a neckpiece; they are ambiguous, mysterious, luminous and whimsical jewelry pieces synthesizing visual and tactile elements to stimulate their simultaneous experience for viewer and wearer. As "wearable creatures" they exemplify the notion of portraying a blown-up world of microscopically investigated living organisms, simultaneously suggesting their internal growth and decay and their interactions with the body. Similar to bioluminescent life forms, these "wearable creatures" inhabit a life of dualities as they bear and bare their light.

**Table of Contents**

Curiosity, a desire that is hard to rein in, is a primal human urge that manifests itself through exploration, investigation, and learning.

--Peter Bauhuis[1]

**Introduction**

Nature exhibits immense and startling beauty in the structures, materials, colors and textures of its organic life forms. Yet, what lies beneath the exterior structure of the form is an internal life that grows, multiplies and decays. Human beings are moved to interpret these life forms and processes as symbols of beauty embodying qualities that exalt pleasure to the mind and soul. They have inspired the jewelry artist over the centuries and cultures.

My early studies in the natural sciences, particularly biology and botany, grounded me in the microscopic investigation of living tissues and taught me to observe changes that take place over the course of creation, division, growth and death. Learning itself became a "loupe" that facilitated my interest in regeneration, in the cycles of life and death. I drew what I saw to record my observations. These drawings became a vital part of my science journal and a source of inspiration and reference for research. Since those first studies, I have worked to develop jewelry forms directly inspired by organisms living in the deep sea and on land. These include corals, jellyfish, octopuses, beetles, fungi, lichens, mushrooms, worms and other organisms, such as bacteria. I am curious about the skin-like yet bony external structures of these living organisms and also intrigued with their behavioral mechanisms, particularly, bioluminescence.

Bioluminescence is the process in which a living organism produces light from within and without generating much heat. Two substances are required: a luciferin, the light-producing

[1] Gasper, M. (2013, March). Peter Bauhuis: In Praise of Curiosity. *Metalsmith*, 13 (2), p.25. Print

substance which may also be a protein, and a luciferase, an enzyme that combines with molecules of oxygen or with molecules of the high-energy producing ATP (adenosine triphosphate, found in every living cell) catalyzing this chemical process.[2] Bioluminescence is found in marine and terrestrial habitats, though not in freshwater; forms of a luciferin vary in habitats and organisms. Bioluminescence is also produced by symbiotic organisms such as bacteria that reside, multiply and decay within host entities. The term, luciferin, the substance for the production of light, is derived from the Latin *lucem ferre*, or 'light-bearer.' [3]

Attraction, camouflage, communication and defense are four primary activities of bioluminescence. Each comes into play and varies greatly depending on the organism and habitat in which it lives. In addition, not all bioluminescent organisms emit light continuously; some flash or blink while others light up only when closely approached and yet others conceal their light then suddenly display. While some bioluminous forms, such as one-celled plankton, the dinoflagellates, live near the ocean surface, most dwell 660 feet to 3,300 feet beneath it. Even faint daylight does not penetrate these twilight reaches; the red, orange and yellow light waves of sunlight are absorbed by the seawater, violet light is diffused and only a range of blue-green light is visible. Blue light waves are shorter and faster and are thus able to travel and remain visible in the ocean's darkness.[4] These facets of bioluminescence, the process and its organisms are central to my research, experimentation and the construction of my "wearable creatures."

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[2] Branchini, B.R. (2013, August 2) Chemistry of Firefly Bioluminescence, 1-17. Retrieved from http://photobiology.info/Branchini2.html (accessed 04/01/16)

[3] Chorge, S. (2008, February) Bioluminescence, 1-6. Retrieved from http://www.biology-online.org/articles/bioluminescence/adaptations-bioluminescence.html (updated 2008, March; accessed 04/25/16)

[4] National Geographic Online. (n.d.) "Bioluminescence." Retrieved from http://education.nationalgeographic.org/encyclopedia/bioluminescence/ (accessed 04/20/16)

**Materials and Methods**

My investigations into bioluminescence drew me into the inner worlds and workings of these mysterious and curious life forms. As a consequence, I investigated the use of non-traditional materials and methods to interpret the forms, body and mechanisms carried at the microscopic level, deep within the cell.

After drafting an idea, I work spontaneously to construct a form that grows, multiplies and gives birth to an ambiguous entity. It is familiar yet not easily identifiable and retains qualities of multiple entities derived from different sources. To construct the piece, I fabricate the exterior so that it appears to house or support an organism in a state of perpetual flux. For example, bone, as a solid structural element, lies beneath the surface of the skin, where it supports and protects the softer tissues. Similarly, I synthesize metal and silicone to depict the relationships between bone and skin, inorganic and organic, hard and soft. Silicone forms the skin and the metal acts as a bony armature and secondary organ sheltering tissue.

I intentionally choose the non-traditional materials, silicone and polyurethane, to convey my understanding of membranous body tissue. These materials impart a visceral, flesh-like quality to each piece. The viscous nature of silicone also offers a unique opportunity during the construction process. Silicone is originally in a liquid state and can be poured to create string-like droplets resembling antennae or tentacles. These linear elements make each “wearable creature” look as if it is alive, growing and reaching for the light, and can even convey an excitement such as that experienced by living organisms. These elements thus add the important components of movement and fluidity and their animated quality suggests a dialogue that simultaneously entices and repels. It also enables me to subtly impose these dualities as a visual and tactile experience when the jewelry piece is worn. Lastly, silicone retains an appearance of fluidity or semi-fluidity;

it is tactile, faintly or overtly sticky, gummy, clingy, and thus able to adapt to parts of the body in unexpected ways.

My fascination with tissues and their textures also compels me to explore different methods to manipulate silicone to create evocative and provocative organic surfaces. With the addition of a thinning agent, delicate, skin-like layers can be cast, sliced, pierced and joined. With the addition of a thickening agent, a paintbrush can be used to create rough, wavy, slimy and viscid textures.

Translucency, luminosity and vibrancy are the defining visual qualities of my jewelry. Their juxtaposition creates a contrast that seduces the viewer's attention and echoes the shimmering, flickering, unworldly qualities of bioluminescent life forms. Cytoplasm, the clear, jelly-like fluid that fills the membrane of every cell, is the inspiration for translucency. Certain marine creatures, such as the delicate Crystal Jelly Fish (Aequorea victoria) possess a jelly-like body that exemplifies this translucency (Figure 1). A soft and sticky translucency also encases the vibrantly colored bodies of these "wearable creatures" to suggest an illusion of growth in an unpredictable organism. The luminous part of the jewelry piece emulates a host entity residing in the non-luminous body of a larger entity, as if it is grabbing, sucking or consuming that part of the host. Luminosity is achieved by adding phosphorescent pigments to colorless silicone. When immersed in ultraviolet light they illuminate as if alive from within, baring a mesmerizing light similar to that found in the natural world.

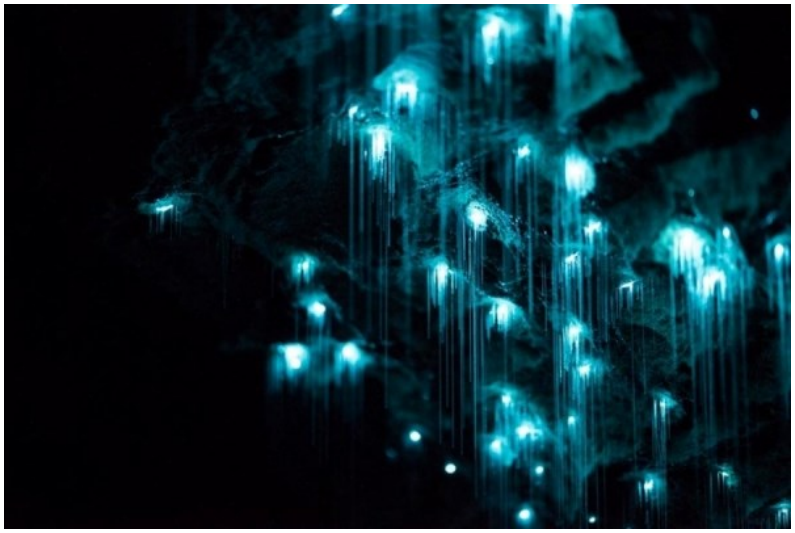
(Figure 1) Crystal Jellyfish

I also choose distinctive color combinations. These colors and the vibrancy created by phosphorescent pigments add elements of ornamentation and exquisiteness to the "wearable creatures." Most are blue-green pigments. With the rare exceptions of a few living in the ocean's lightless abyss, most bioluminescent marine life forms emit a blue-green light. In contrast, some terrestrial life forms, such as fireflies, fungi, glow-worms and lichens emit a range of yellow, green or red light; the green light of many of these organisms is produced in connection with decay [5] (Figure 2). I have interpreted all the colors found in Nature into my "wearable creatures."

[5] Chorge, S. (2008, February) Bioluminescence, 1-6. Retrieved from http://www.biology-online.org/articles/bioluminescence/adaptations-bioluminescence.html (updated 2008, March; accessed 04/25/16)

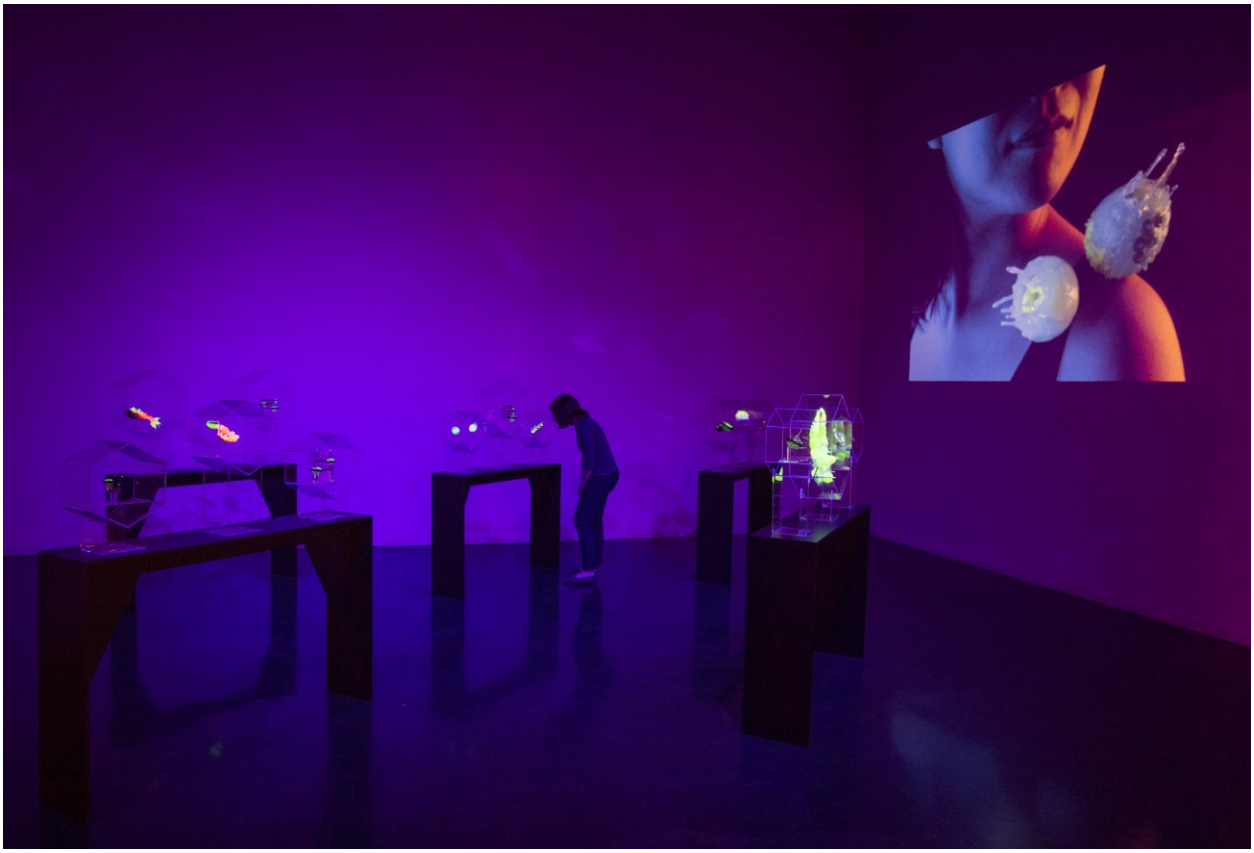
Not all bioluminescent organisms glow continuously; some flash or blaze or blink to distract and confound a potential threat or to attract a mate or prey or to communicate information. To interpret this behavior and add an element of surprise, I installed motion sensors in two jewelry pieces. These sensors are not concealed within the piece yet remain unnoticed until stimulated. When someone comes within a few inches of the "wearable creature," the motion sensor activates and a part of the piece bursts into a small blaze of light.

(Figure 2) Glowworm



(Figure 3) Glowworm in New Zealand cave

**Exhibition**

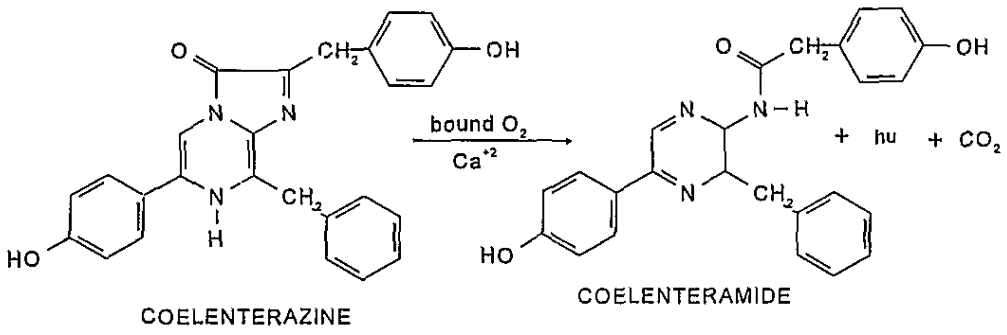


(Gallery view)

My gallery installation combines objects, images, light and space to create a multi-sensorial experience that wholly envelops the visitor. Entering an ultraviolet light-lit space, the viewer confronts glowing objects resting in scarcely visible hexagonal structures. Five display tables are arranged diagonally for the viewer to investigate the work closely from all sides. Digital images of the jewelry, worn as if they inhabit and grow from the body are projected overhead on the wall behind the gallery entrance and are discovered only after viewing the jewelry.

Initially, a visitor stops, comes close and investigates what is on all sides of each piece still and at rest in its display. The viewer is attracted to touch and explore, but at the same time draws back, uncertain of the experience or even if touch is permissible. My “wearable creatures” thus

stimulate a subtle sequence of attraction-and-repulsion similar to that of some bioluminescent life forms found in Nature. The projected images of the "wearable creatures" embracing and nestling on the body invite the viewer to uncover unfamiliar relationships between the body and the jewelry. As seen in the images, on the body the creatures become active while remaining ambiguous. They ornament and yet take on a different life as if something, an unknown life form perhaps, grows or moves or perhaps subtly consumes, as it adorns a specific part of the body.




(Figure 4)

To create the gallery experience, I synthesized art and elements of the science behind bioluminescence. I deliberately choose a hexagonal structure to house the jewelry. This structure is derived from the representation of an organic protein, the benzene ring, which is a hexagon. Intrigued by the pattern created by protein (as luciferin) as it combines with oxygen or ATP to create light energy[6], I deliberately arranged the hexagonal displays in groups of three to suggest the continuous flow of energy required to light the "wearable creatures," as if they share and regenerate this light energy among themselves.

[6] Bryan B.J., Szent-Gyorgyi C., Szczepaniak W. Renilla reniformis fluorescent proteins, nucleic acids encoding the fluorescent proteins and the use thereof in diagnostics, high throughput screening and novelty items**.** U.S. Patent WO2001068824 A2, Abbrev. Sept, 20, 2001**.**

My jewelry pieces are displayed in an unconventional manner and without the use of vitrine covers in order to emulate the surroundings in which such bioluminescent life forms may be at home and thrive. (View 2) I use ultraviolet light to create a dim, hazy, warm, unworldly purple-to-black atmosphere in the gallery. Ultraviolet light alters perception of the work and space, and interacts on human skin, warming it and with prolonged exposure, altering a color. At a distance, the light becomes fuzzier and disorients; the pieces appear to float yet rest in space. The individual displays, fabricated from clear Plexiglas, disappear in the soft, imperceptibly warm and subtly waving purple-to-black light. This generates an experience of dissociation, especially when viewing the work at close hand. The gallery experience thus culminates in the experience of an enveloping and palpable unreality wherein mysterious organisms float and bare their light.

(View 2)

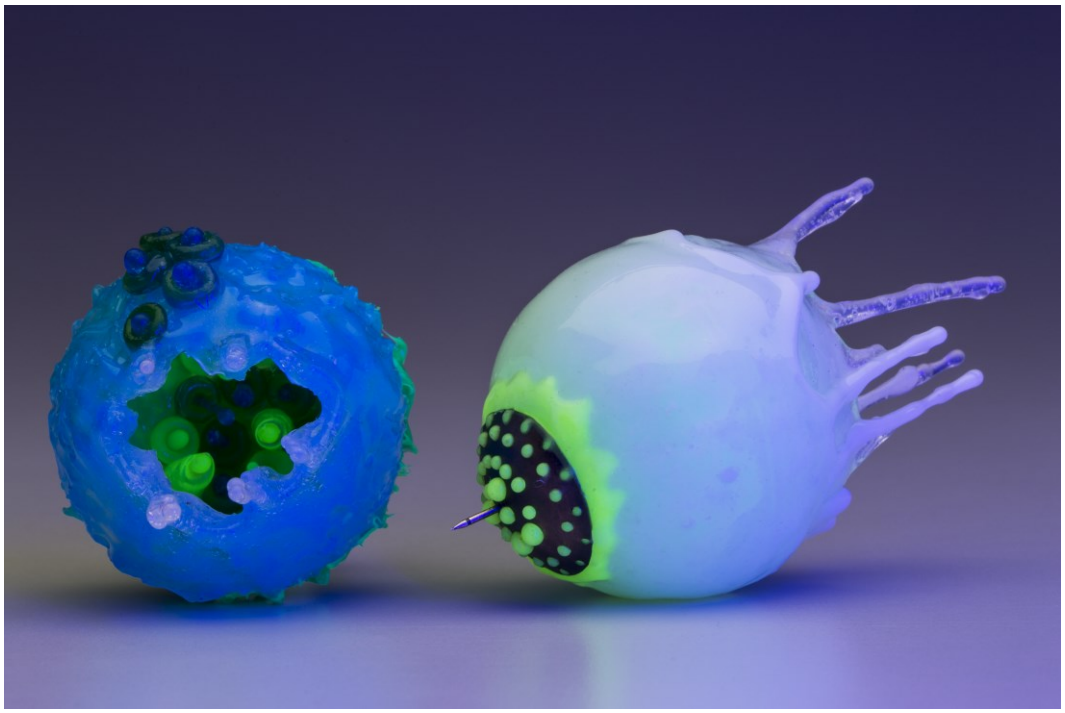
(View 3)

(View 4)

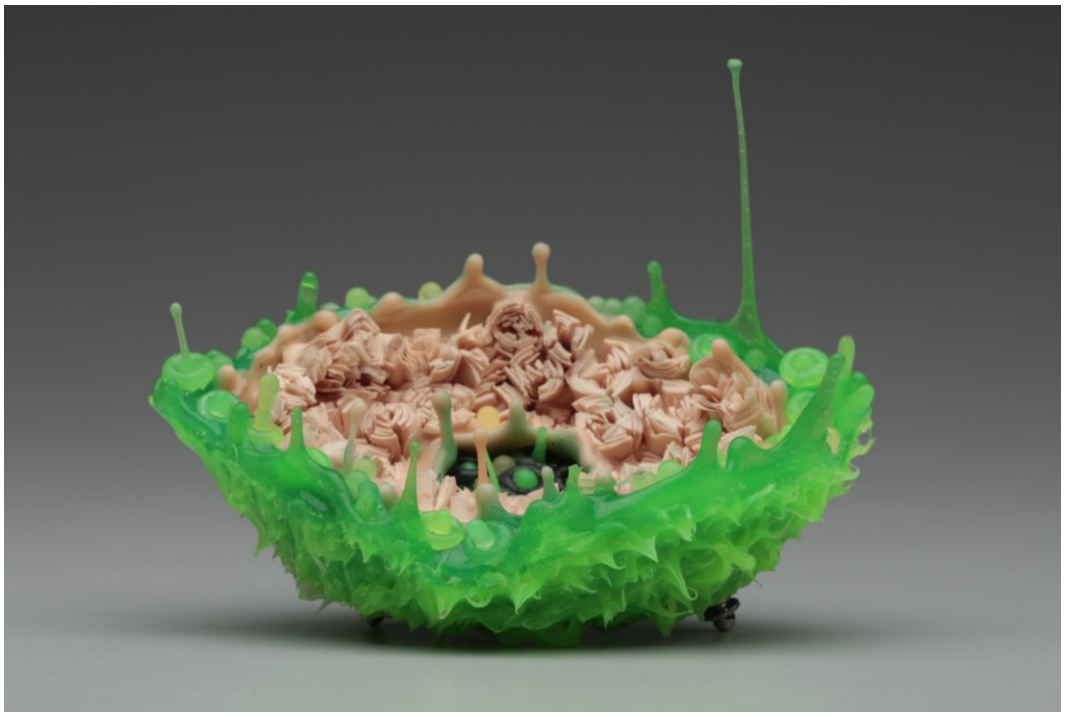
## Conclusion

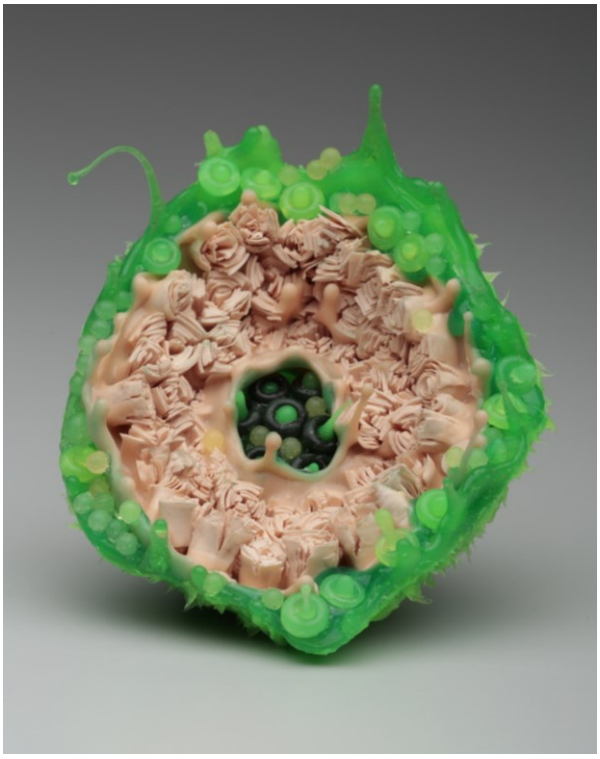
My membranous "wearable creatures" glow, blink, startle and drip, qualities that can be interpreted as responses to unknown stimuli and as an interpretation of the process of bioluminescence. My jewelry pieces embrace beauty, sensuality, luminosity and vibrancy. If ornamentation in Nature encompasses the necessity of attracting mates or luring prey or dumbfounding and defending against predators, what occurs when ornamentation grows and erupts from the human body and infiltrates the environment around it? My "wearable creatures" exemplify the notion of portraying a blown-up world of microscopically investigated living organisms, while simultaneously suggesting their internal growth and decay and ambiguous interactions with the body. The body becomes a site for these "creatures" to exist. As jewelry pieces they may not be worn unawares; their scale, textures and enigmatic colors demand space and attention and evoke uncertain responses that include the discomforts of fear or caution and the joys of whimsy and play. These "wearable creatures" themselves thus develop as an intimate relationship between body, wearer, viewer and lastly, the maker. Similar to bioluminous life forms in Nature that alter themselves in response to light, darkness and other stimuli, my jewelry, as "wearable creatures," inhabits dualities; subdued in natural light and luminous in ultraviolet, beautiful and edgy, familiar and inexplicable, light-bearer and light-barer, at home and at play with light and darkness.

**Gallery**

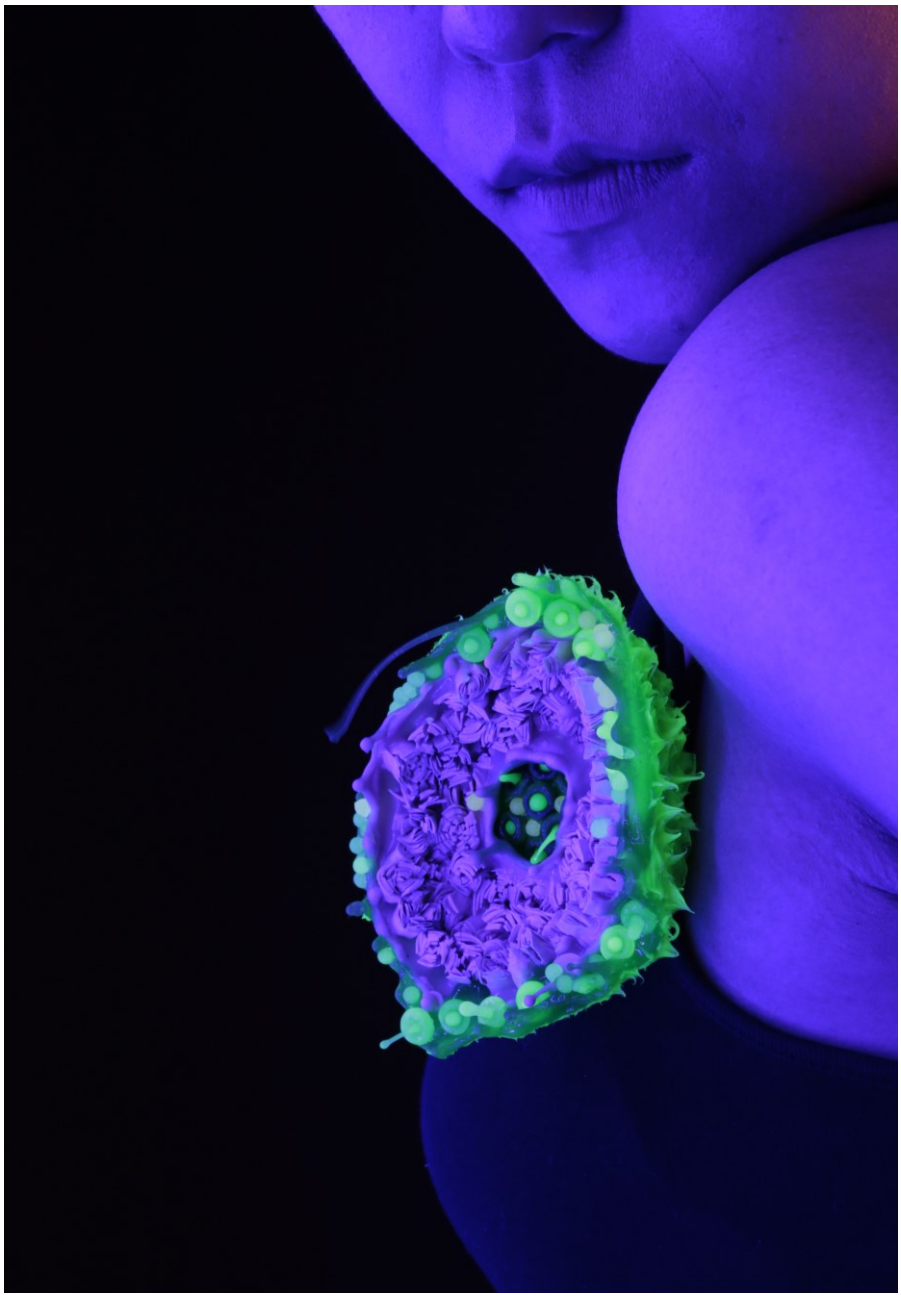


Brooch I & II (On the body)
Silicone, glow-pigments & copper, 2”dia



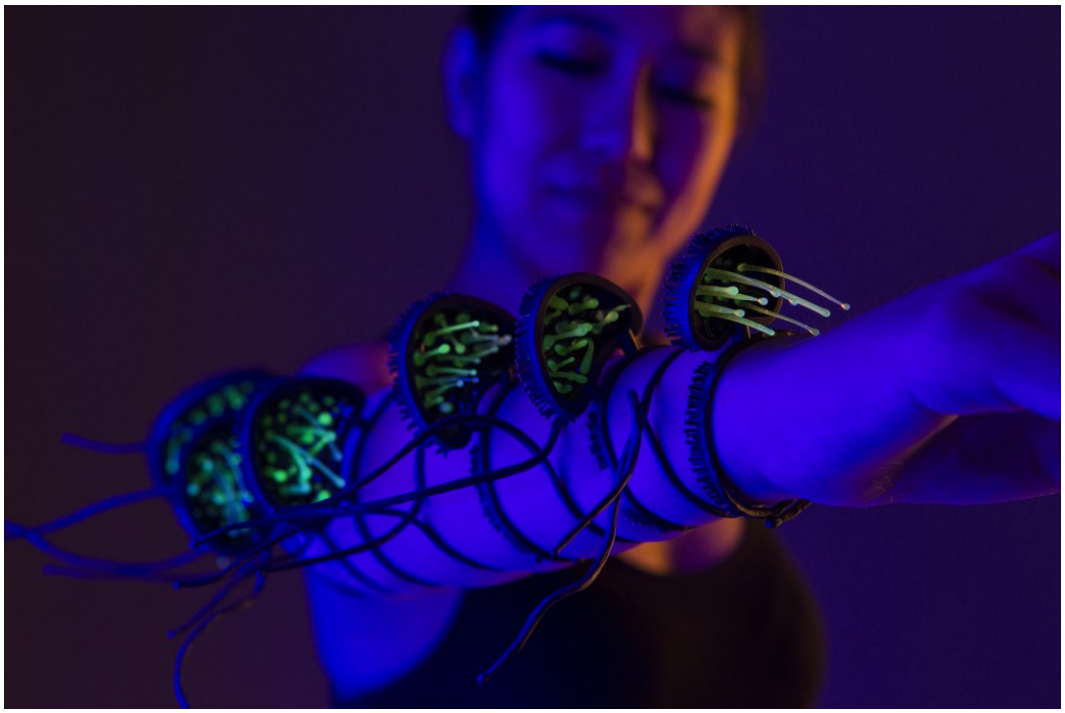


Brooch III
Silicone, glow-pigment & nickel silver
4” x 2.5” x 1.75”

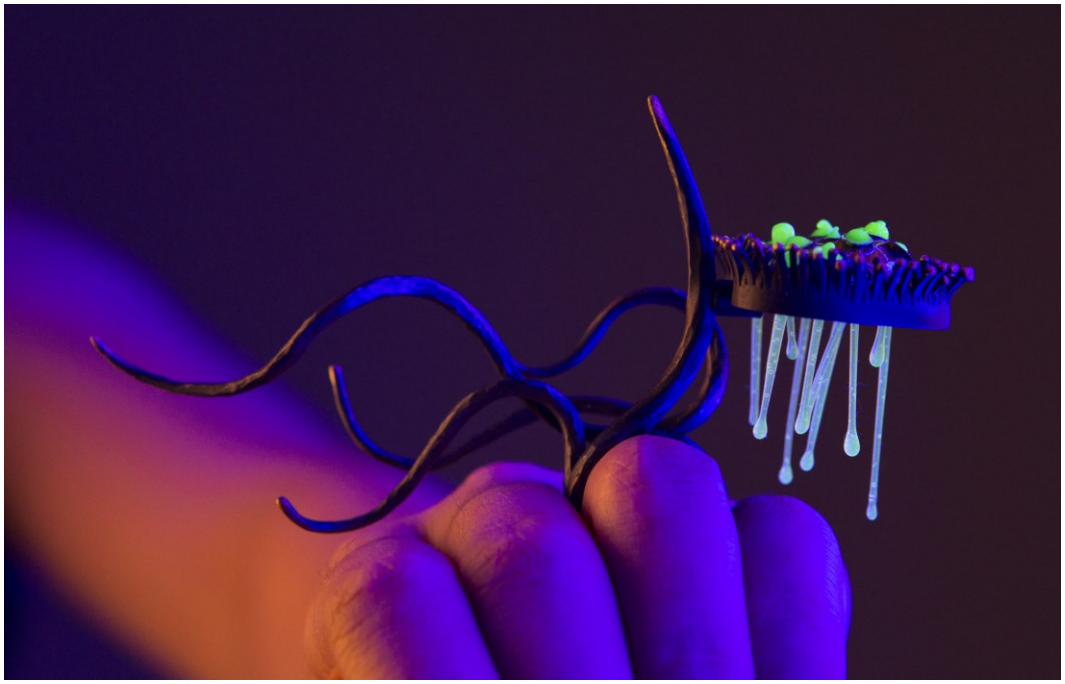


Brooch III (on the body)
Silicone, glow-pigment & nickel silver
4” x 2.5” x 1.75”

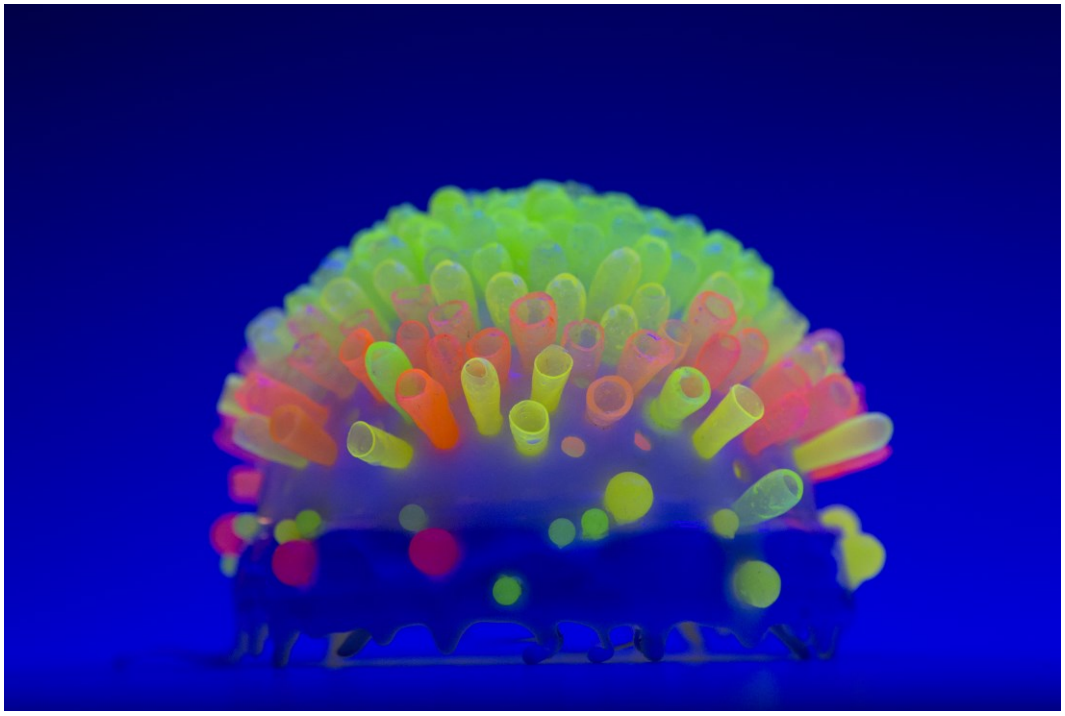
Armband (on the body)
Copper, Vitreous Enamel, silicone, glow-pigment & gold leaf paint



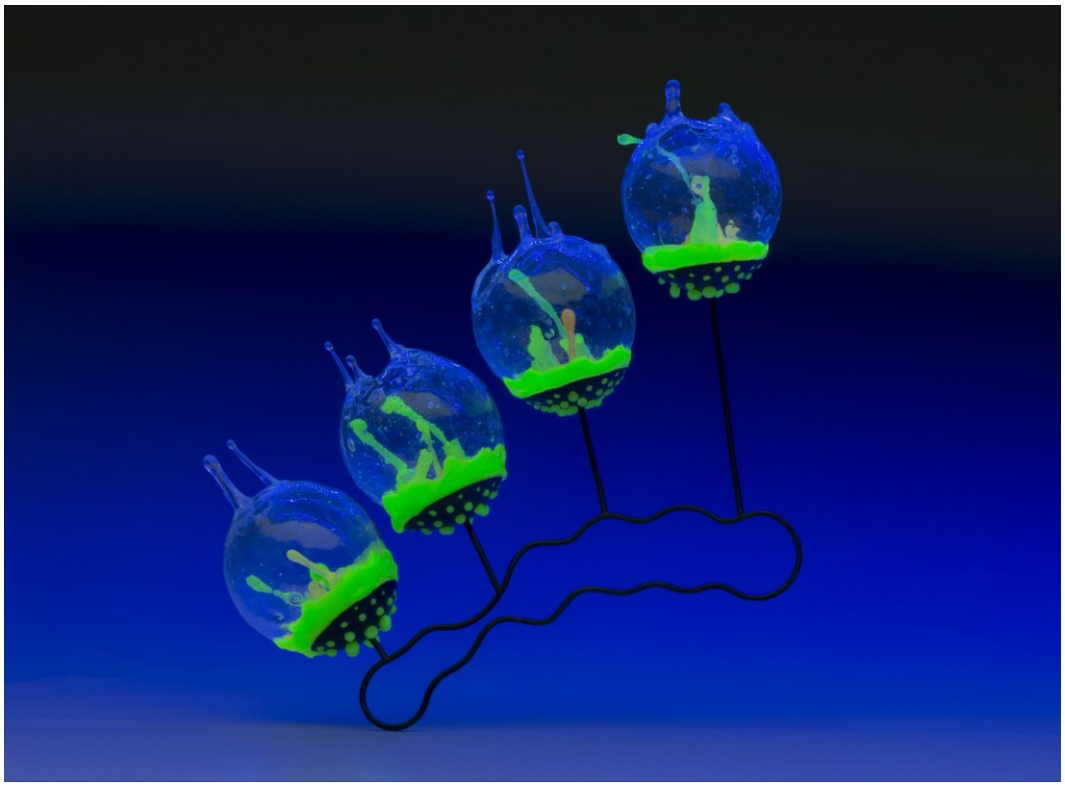
Armband
Copper, vitreous enamel, silicone, glow-pigment & gold leaf paint



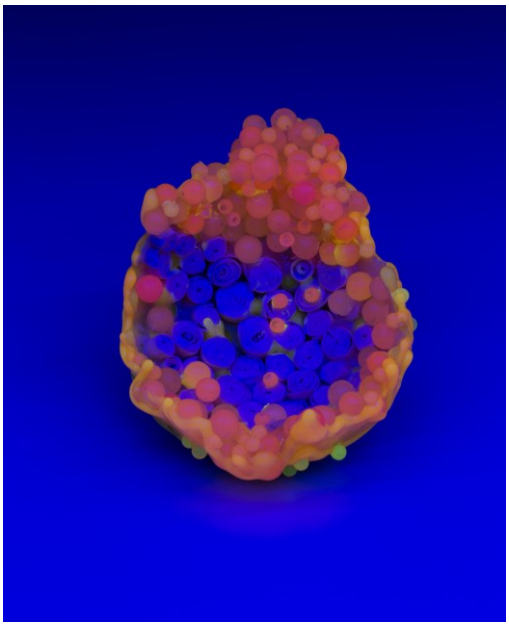
Ring I
Copper, silicone, glow-pigment & gold leaf paint
1.5”x 1”x .75”



Brooch IV
Silicone, glow-pigment, wood & nickel silver
4” dia x 3” h

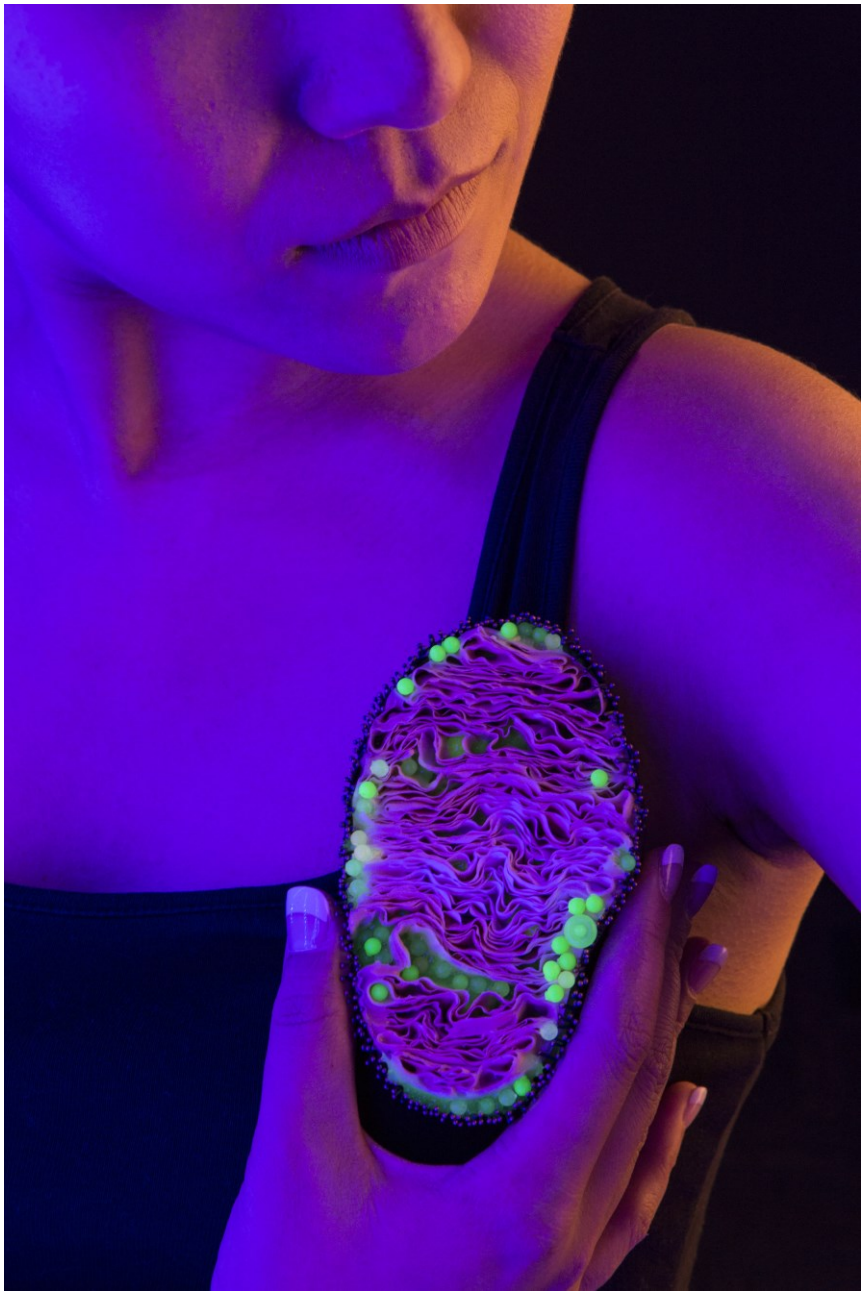


Ring II
Silicone, copper & glow-pigment



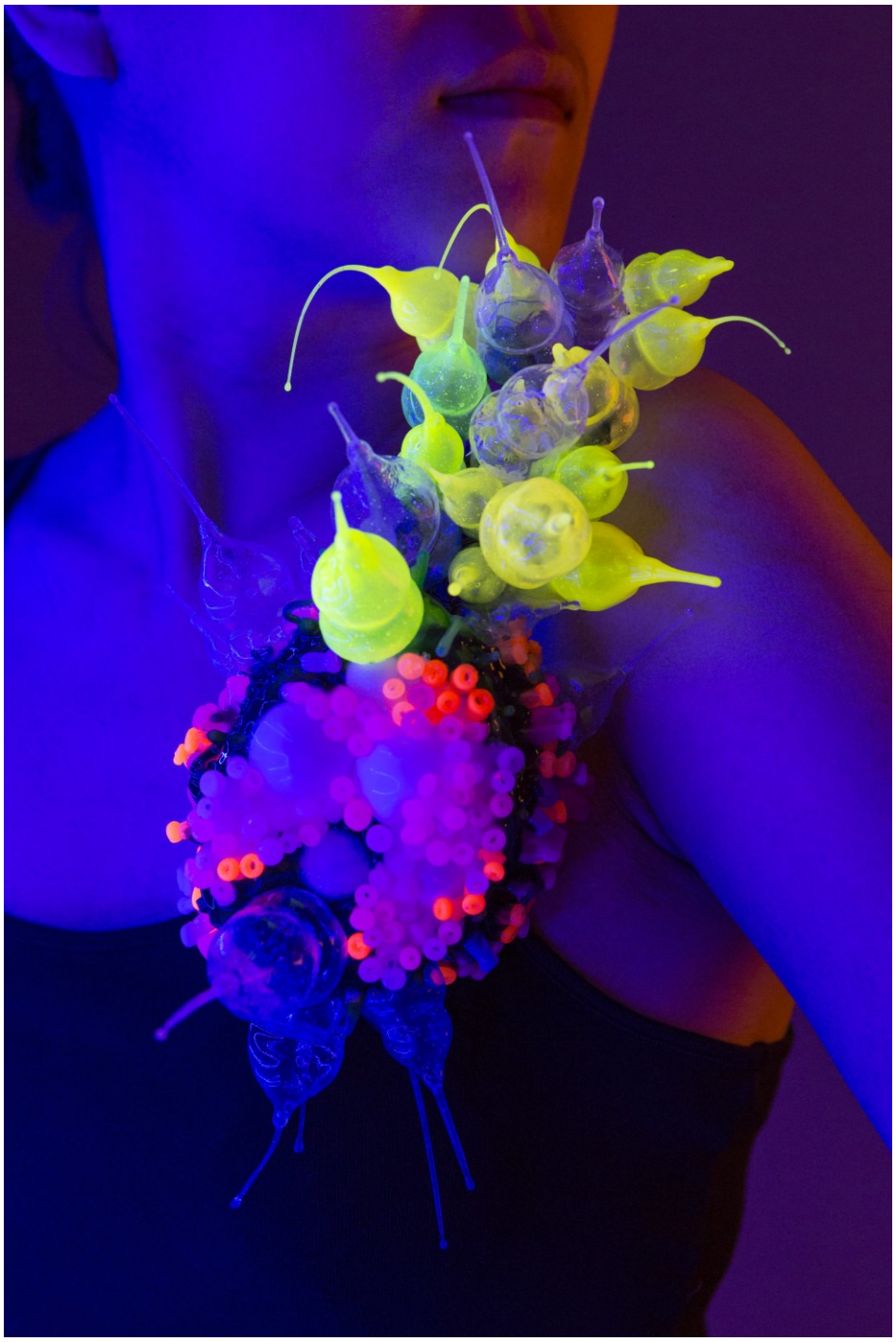
Brooch VII
Silicone, copper & glow-pigment
4” x 2.5”

Ring II & Brooch V (on the body)



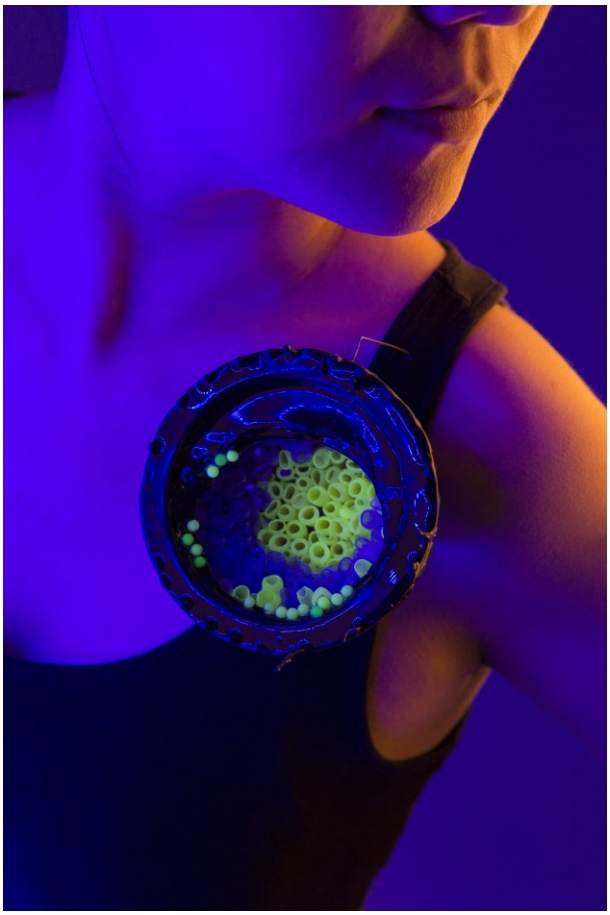
Brooch VI
Silicone, copper & glow-pigment
4” x 2.75”

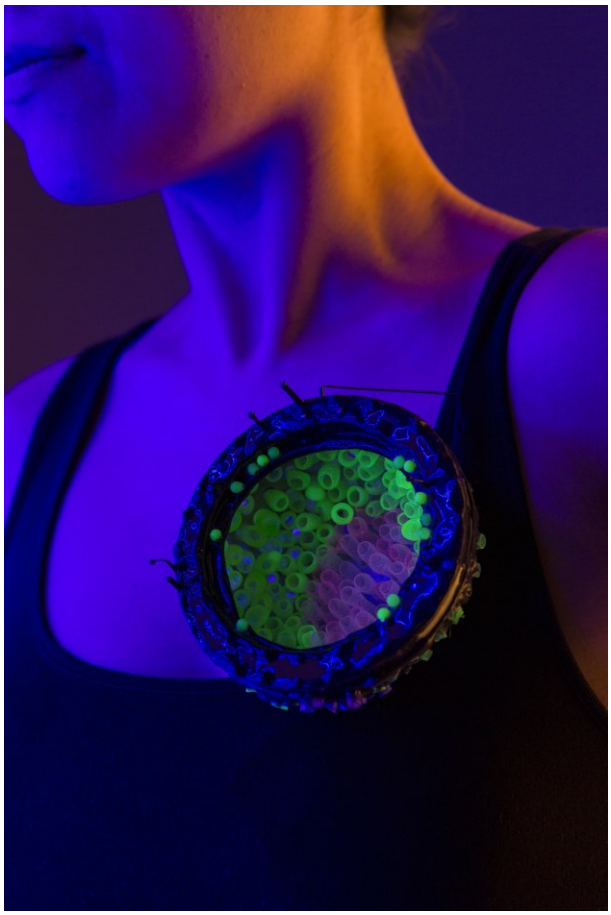
Neckpiece
Silicone & glow-pigment
1.5’ dia



Brooch VII
Silicone, wood, copper & glow-pigment
8” x 4” x 4.5”

Brooch IX
Silicone, wood, copper & glow pigments
4” dia x 3”





Brooch X
Silicone, wood, copper & glow-pigments
4” dia x 3”

## Works cited


Arche, Jill. (2015, July). "Photographer Snaps Natural Miracle of Glow Worms In 30-Million-Year-Old New Zealand Cave."
Retrieved from https://techtimes.com/articles/66374/20150707/photographer-snaps-miracle-of-glow-worms-in-30-million-year-old-new-zealand-cave.htm (Accessed 04/20/16)

Branchini, B.R. (2013, August 2) Chemistry of Firefly Bioluminescence, 1-17. Retrieved from http://photobiology.info/Branchini2.html (accessed 04/01/16)

Chorge, S. (2008, February) Bioluminescence, 1-6. Retrieved from http://www.biology-online.org/articles/bioluminescence/adaptations-bioluminescence.html (updated 2008, March; accessed 04/25/16)

Gasper, M. (2013, March). Peter Bauhuis: In Praise of Curiosity. *Metalsmith*, 13 (2), p. 25. Print

Haddock, S.H.D.; McDougall, C.M.; Case, J.F. "The Bioluminescence Web Page", http://biolum.eemb.ucsb.edu/ (created 1997; updated 2011; accessed 04/25/16).

National Geographic Online. (n.d.) "Bioluminescence." Retrieved from http://education.nationalgeographic.org/encyclopedia/bioluminescence/ (accessed 04/20/16)

Wikipedia contributors. "Aequorea victoria." *Wikipedia, The Free Encyclopedia,* https://en.wikipedia.org/w/index.php?title=Aequorea_victoria&oldid=710716751 (accessed 04/20/66).