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Spiritual Union: an intersection of artistic expression with scientific methods

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SPIRITUAL UNION:
AN INTERSECTION OF ARTISTIC EXPRESSION WITH SCIENTIFIC METHODS

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Fine Arts
in
The School of Art

by
Taehee Kim
B.F.A., Hanyang University, 1992
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ABSTRACT

My body of work, “Spiritual Union,” is an exploration of artistic ideas contrasted with approaches to scientific technology. I investigate diverse physical phenomena and media and examine symbolic structures to express concepts of transcendence and spirituality in Buddhism. On deep levels, I have observed the natural beauty, richness, and complexity of organic forms. This has led to exploration and experimentation in the area where the boundaries between the artistic and the scientific fields converge. Employing an interdisciplinary approach that includes art and science, I have expressed the spiritual meaning of Buddhist lotus motifs and created a record of my own journey of understanding.

CHAPTER 1. INTRODUCTION

Artistic ideas and approaches to scientific and technological investigations are emerging in research fields from many rapidly developing digital media technologies. Current technological and scientific innovations inspire me to create never-before-seen images of our world and creative processes. The catalyst for my concepts was the introduction and use of digital media, which gave me the ability to explore personal expressions of freedom and imagination.

Meaningful traditional motifs can be considered a visual language which humans have used since ancient times in an attempt to express inner feelings. My examination of Korean motifs can be distinguished by their representation of indigenous values and beliefs. Incorporating religious rituals, characteristic motifs are visible in many Korean artifacts. Most of the Korean motifs that we use today have evolved through various historical changes.

I explore the beauty of an intersection of aesthetic development with scientific methods by using the element of a Korean motif: the lotus. Through a visual exploration using scientific methods, I employ diverse physical phenomena and media for my body of work and to express the meaning of traditional motifs in a metaphorical way.

New experimental approaches together with a multimedia presentation, incorporating visual material that created methods and technologies is a key component of my work. Distinct Korean symbols, lotus, are reproduced using these methods and technologies that have been redirected to the development of art. Content and imagery for this project is based on Eastern thoughts as a principal element in the message delivery. Through the investigations of “Spiritual Union,” I endeavor to express the mystical beauty of an artistic and a scientific world.

CHAPTER 2. ART AND SCIENCE

Artistic ideas and desires can be expressed and realized through many media. The expression could be any type of spiritual communication whether it is visible or touchable. Creative expression and media have been influenced by cultural movements and the technology available in every age. Since the sixteenth century art has drastically changed both in concepts and in methods with the application of scientific technology.¹

The history of film and video demonstrate the relationship between art and science. After film was invented in 1895, creative artists immediately began to use it as a means of expression.² As a result, film and video installation has become mainstream in conceptual art and the use of technological media has become commonplace. From the perspective of the movement that explores overlap between art and science, it is obvious that the way to realize artistic works has been influenced by the technologies used by scientists. However, I believe that scientific technologies have also been influenced by the enthusiasm of artistic expression.

An artist's passion and belief influenced the birth of a new technology. Michael Naimark was an experimental media artist and researcher who actively worked in cinematography, interactive systems, and immersive projection. His artistic search to create new imagery and meaning led to an improvement in film and media technology. Collaborating with various companies, such as Panavision and Apple, a movie project which would mimic camera movement (3D Moviemap and 3D Panorama) was invented.³ An artist's persistent endeavor motivated scientific technology.

Computer graphics and computer technology are other examples of the relationship between art and science. Computer technology allows us to work with computer graphics. While

utilizing the computer as a medium for artistic expression, computer technology has been developing to meet the artists' desires. For example, an artist's intention to immerse the audience in an imaginative world inspires interactive computer technology and virtual reality.⁴ Consequently, a creative artistic desire provokes another scientific innovation.

Especially in the last couple of decades, artistic concepts increasingly influence and fertilize technologies in the emerging fields of art and science. Not only do artists investigate with the tools of scientists, but scientists are also more open to the new possibilities springing from this dialogue as well. My belief is that art and science are ultimately one. One does not exist without the other. Improvements in science reflect improvements in art and vice versa.

I now observe not only how aesthetic concepts impact scientific innovation but also how the union of art and science creates an important connection between intelligence and substance, especially in the cultural conception of life. My first step has been to explore and revise my own concept of the relationship between art and science. I will keep extending my investigation of the intersection of art and science in order to look for a new historical art form emerging in the future.

CHAPTER 3. THEME: SYMBOL AND MEANING

Metaphorical representations are often more meaningful and impactful because they carry multiple levels of information. — Robert Dilts

This body of work presents the concept of transcendence and spirituality in Eastern philosophy and its principles and spiritual meaning with parallels between the spiritual plane and the physical plane. My Buddhist experiences significantly influence my work due to the emotional, spiritual, and intellectual impact of these influences on my life.

In Buddhism the lotus symbolizes purity, alluding to the inner divine potential. It generally has eight petals representing the Eightfold Path and is reserved for the highest deity. Its roots in the mud represent man grounded in the material world. The lotus stalk passing through the water and the blossom reaching for the sun symbolize man's ability to reach the spiritual world by rising above his world.

I have expressed my personal spiritual journey by using the tools, techniques and experimental processes, to manipulate the symbolism of the lotus. The abstract images that I have created show artistic beauty, depth, and context created through my exploration of the symbolic structure of this flower. The experience of working on this project has been a personal transformation. The deep contemplation and devotion to the process has allowed me to walk through the doorway of the material world into the spiritual world. I feel inner peace and focused concentration and my hope would be that this body of work could challenge the viewer to find a transcendent path from the material world to the spiritual world.

3-1. Meditation

Experimentation with the lotus motif on semiconductor material using a pattern generator illustrates the traditional lotus symbol through digital data bits. This image represents a transcendent path from the past to the present and from the material world to the spiritual world. It is my expression of using a new artistic approach with scientific methods while merging the cultures of art and science.

Installation of 108 pieces states the Buddhist notion of Paekp'albonnoe, the hundred-and-eight torments of mankind. In the philosophy of Buddhism there are Yukgun (the six organs of eye, ear, nose, tongue, skin, and intellect) and Yukjin (the six senses of sight, hearing, smell, taste, touch, and will). When these senses connect together, humans experience distress, pleasure, and circumstances that are neither distress nor pleasure, so eighteen torments arise. Each of the eighteen torments is compounded by greed or a lack of greed, so thirty-six torments arise. Finally, these thirty-six torments have past, present, and future configurations, so 108 torments arise. To remove the torment, people practice bowing 108 times to release the torments from their present lives. In order to convey the meaning through the 108 pieces, I attempt to express new concepts of design that are a transcendental dialogue beyond the appearance of the physical world.

3-2. Optical and Electron Microscopic Images

Digital microscopic images of the lotus suggest the realms of imagination. Optic and electron microscopy serves as a medium for the expression of my pre-conceived notions and imagination. I was fascinated by the machinery used in the new medium both in a real and metaphorical way. I observed the natural beauty, richness, and complexity of organized structure. Installed lotus abstract images expressed with glass, water, and light symbolize philosophical

elements of earth, water, and air. These elements illustrate my idea of the material, intellectual, and spiritual world.

3-3. Lotus and Device

The simultaneous experimental videos and sound installations showing microscopic lotus images and scientific devices present an overlap between the physical world and the spiritual world. The chanting of my temple priest combined with the sounds of machinery illustrate the spiritual moments of my life. Using motion sensor technology, these interactive sounds are meant to convey a possibility of the complexity of life and to hint at the deeper meaning intended in my message delivery. These moving images show the great beauty and depth of structure beyond the lotus as seen by the naked human eye.

Metaphorical images allow many levels of representation and meaning. When we observe creation, we only see a single level, the visual surface of an object. This led me to question the nature of existence for organisms without consciousness, such as the lotus itself.

CHAPTER 4. EXPERIMENT

Meaningful creative experiences are becoming one of the important values to attempt experimentation in the movement that explores overlap between art and science. Understanding the characteristics of new media enables visualization of an artistic idea. This chapter describes the scientific methods as new media with my meaningful experience at the Center for Advanced Microstructures and Devices.

By merging artistic expression with the tools, techniques and experimental processes of the scientists, I have experimented with three objects: the lotus motif on semiconductor material using the pattern generator experiment, optic and electron microscopic images of the lotus, and videos and sound installations of the microscopic lotus and scientific devices with motion sensor sounds.

4-1 Lotus Motif on Semiconductor Material

Three different patterns of lotus motifs were impressed on silicon crystal wafers and polymer plates using scientific methods under my direct artistic expression. The patterns were prepared by a pattern generator, which is used to make digitized patterns of circuits for semiconductor devices from AutoCAD. To transfer the images of the motifs, methods of semiconductor-device-fabrication were employed such as metal deposition using an electron-beam thermal evaporator, ultra-violet optical lithography and metal etching. Patterns of data codes were overlaid consecutively on the transferred motifs.

The deposited metals were chromium, gold, titanium and/or copper with thickness several hundred times thinner than a sheet of paper. The process of ultra-violet optical lithography was similar to the process of photolithography and was involved of three steps:

application of UV light sensitive photo-resists on top of deposited metals, exposure of UV lights to transfer patterns through digitized images of motifs or micro bar codes, and development of exposed photo-resists. Using metal etching chemicals, metal patterns of motifs were created along with the developed photo-resist patterns.

4-2 Optical and Electron Microscopic Images of the Lotus

The microscopic images of the flower, stem and leaf of a lotus were created in two different ways with an optical microscope and a scanning electron microscope (SEM). Each part of the lotus was cut for optical microscopy samples, so that a CCD camera could record visible light through an optical microscope. The decoded images from the CCD camera were transferred as digital files onto a computer. Magnification varying from 5X to 50X was used for the optical microscope.

The SEM is a system used for scientific characterization of microstructures. The SEM provides a highly magnified image of the surface of a material, using a source of electrons in a high-vacuum environment. For my experiments with the SEM, each lotus sample was dried to effectively remove moisture in order to meet this high vacuum and was then coated with gold on its surface in order to produce a high magnification image. The electronically scanned images were transferred to a computer through a probe. The magnification of the SEM was up to 1500X.

4-3 Videos and Sound Installations

The subjects for the moving images were parts of a lotus (flower, stem, and leaf) and scientific devices were provided by the Center for Advanced Microstructures & Devices. The moving images created by the progressive changes in magnification were captured using a CCD camera installed on an optical microscope. Using a video-converting device, CCD images were

converted to MPEG or DVD files. Infrared motion sensors were installed to detect an audience, so interaction between the audience and the multimedia display is possible.

This experimental research has provided real experience in the integration of my creative ideas with scientific methods. The experiences of the most advanced semiconductor processes combined with my ideas have given me unlimited possibilities for a new art medium and form. I was fascinated by the manipulation of optic and electron microscopes, and the ability to travel through what appears to be enormous, wild worlds that I have never seen in the physical world with my naked eyes. Capturing moving abstract images through an optical microscope is an exciting venture of technological and conceptual investigation.

CHAPTER 5. CONCLUSION

From new experimental approaches to concepts and media that merge the fields of art and science, this project has evolved into an intersection of aesthetic development with scientific investigation, using an element of a Korean motif, the lotus. My personal spiritual journey was illustrated by the symbolism of the lotus from my Buddhist experiences. I express the symbolic structure of the flower as abstract images of my imagination, metaphorically representing the spiritual world and showing the depth of beauty, richness, and complexity. This work might not give my message to the viewer directly, but it presents a challenge to discover his own path to the spiritual world in this moment in time. The union of artistic idea and scientific exploration will bring new opportunities and knowledge, not only for art itself but, – through the integration of the two fields– a new insight.

ENDNOTES

- ¹ Sommerer, Christa, and Laurent Mignonneau. *Art@Science.*(New York: Springer Wien NewYork, 1998), 53.
- ² Sommerer, Christa, and Laurent Mignonneau. *Art@Science.*(New York: Springer Wien NewYork, 1998), 9.
- ³ Naimark, Michael.2002. *Media Art and Research* [online]. Available from World Wide Web:<<http://www.naimark.net/bio.html>>.
- ⁴ Sommerer, Christa, and Laurent Mignonneau. *Art@Science.*(New York: Springer Wien NewYork, 1998), 100.
- ⁵ C. Goodhew, P.J. and F.J. Humphreys. *Electron Microscopy and Analysis.* (London: Taylor & Francis Inc., 1992), 106.

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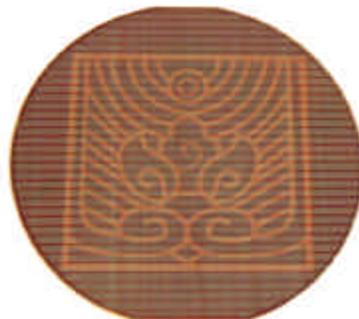
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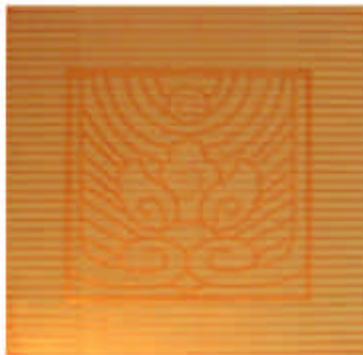
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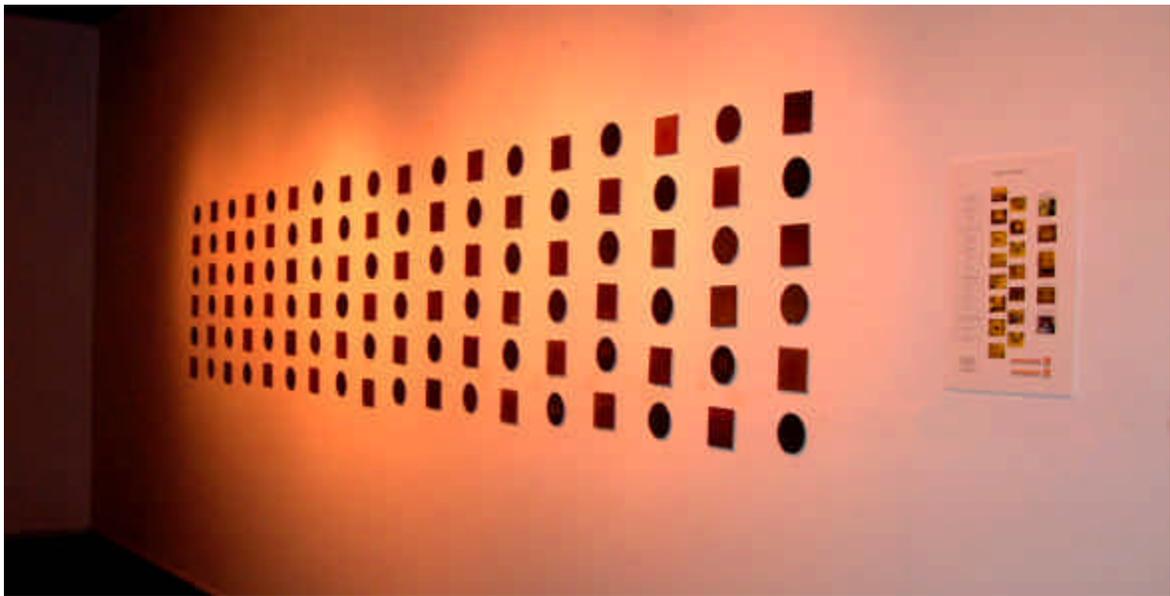
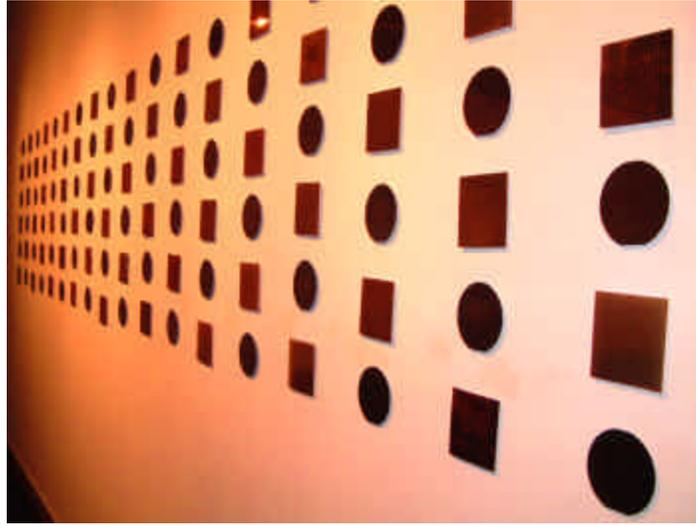
APPENDIX: ILLUSTRATIONS



1. Images of Motifs from Meditation



2. Images of Motifs from Meditation



3. Views of the Installation



4. 8070.1.6.45



5. 8c64.1.3.56



6. 1.4b.8.10



7. 9c64.4.16



8. 19.4.17



9. 8.4.14



10. x1.80k16.7



11. x150200



12. x30099.9



13. x40050.0



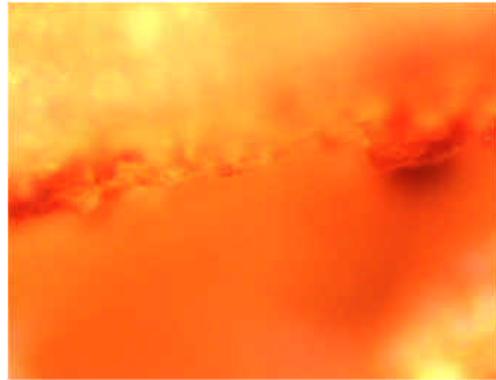
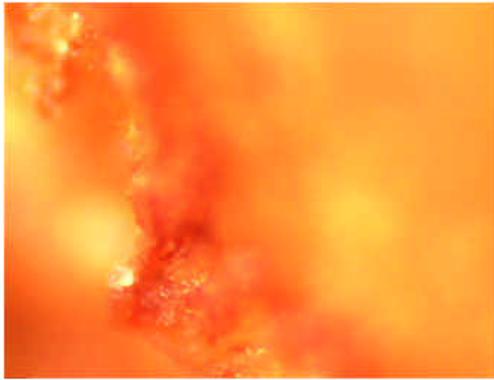
14. x40075.0



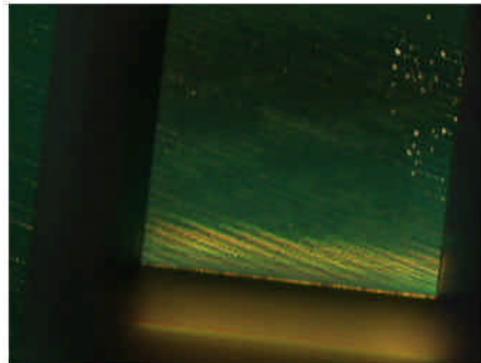
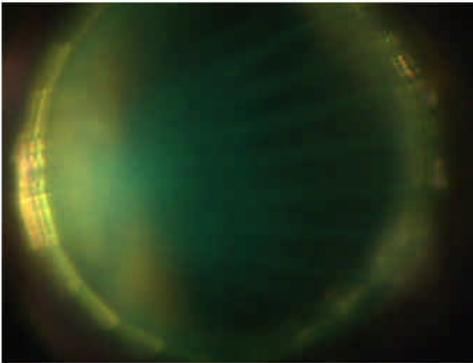
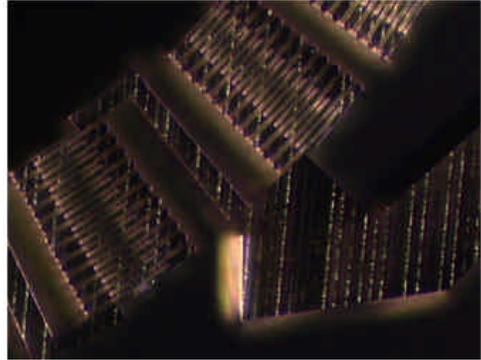
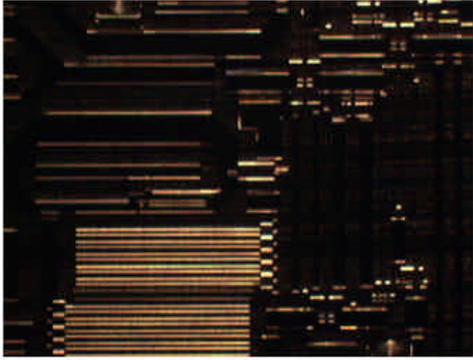
15. x584.51.4



16. Views of the Installation



17. Video: Lotus



18. Video: Device



19. Views of the Installation

VITA

Taehee Kim was born in Kyoun-Nam, Korea, on March 15, 1969. She grew up in Seoul and received a Bachelor of Fine Arts degree in design from Hanyang University in 1992. Having had the work experience as a graphic designer, she made up her mind to receive training in a more advanced institution in America. After she spent time in Chicago, Taehee moved to Baton Rouge, Louisiana, to attend a graduate program in the College of Art and Design. She is expected to receive her Master of Fine Arts degree with a concentration in graphic design in May of 2003.