

Models Tangibles

Miriam Camarillas Marimón

This research project is focused on the relationship between science, technology and art and its visual potential.

It is based on the observation and the study, in different scientific disciplines as Histology, Genetics and Microbiology, of a small part of the enormous variety of microsystems, invisible forms to the human eye, as the DNA, virus, proteins, cells and microorganisms.



MODELS TANGIBLES: The jewels from the transformation of the molecular biology, from the macromolecular DNA and his tangible models.

Tangible Models is a project arising from the collaboration between Alicia Guash Mitjans and Miriam Camarillas Marimon, jewelry designer and goldsmith who founded the firm «G de Joies». Our objective is to materialize the invisible atomic world and recreate it through jewelry.

Miriam Camarillas Marimon,

Jewelry designer, goldsmith and owner of the firm G de Joies

My approach to the world of the science was the result of the concern for find new ways to work. Sometimes the free interpretation of the organic forms is too subjective, just a portion of reality out of the perception. With an eye on mathematics, philosophy and science I made some geometrical structures that represent the universe through the abstraction. In an intuitive way, I made some archetypal symbolism nearly to the history of the ornamentation.

Alicia introduced me into the atomic models, some of the macromolecular shapes caught me from the first moment, I observed the structure of many of them who made me remember some of the symbols that I represented previously on my collections. Those forms brought me back to the ancient platonic solids: the icosahedrons, the hexahedra, the octahedron, the fractal, the logarithmic spiral, the helix..

When Alicia asked me to materialize the virtual atomic Model, I studied which of them were more appropriate for represent on metal. Capture beautiful forms always been the shaft of my work, I live it as a way to get a balance between the chaos and rudeness. In this line I choose the structures with which I would like to work, I felt attracted by the regular-polyhedral forms that reveal the virus. In this way the macromolecular form phi 29 came to me as a wonderful and neary form.

This phage is composed of three parts, the caspide, the connector and DNA. Each piece in this series is based of one of these parts. Contemplating these components independently, it was obvious that themselves have a uniquely beautiful that should be abstracted. The ability to recreate a three-dimensional macromolecular on the mathematical basis of a computer, gave me the tools to alter it, respecting its essence and symmetry.

The objectivity of science and mathematics, allows art and philosophy, take a look into the mysteries that nature reserves. Some examples of this combination are Ernst Haeckel, German biologist and philosopher (1834 - 1919), the goldsmith Wenzel Jamnister (1508-1585), Gold the Dutch mathematician and artist M.C.Escher (1898-1972).

Today's 3d print technology offers a wide range of possibilities in this area for a more freely experimentation with the geometry and for materialize objects with complex shapes. Thus emerges a conciliatory path between the art of abstraction and rigor of science indicating a possible change in perception and conception of the objects that surround us.

3d printers use two basic components to deposit the material by a solid part and a surrounding space that is removed by vacuum aspiration or dissolution.

In jewelry we used two types of wax, one that is diluted with water and another that measures the volume of the piece.

The conversion process is performed through a metal macrofusion.

This technique, also called lost wax casting, is based on the preparation of the piece of plaster molds and metal injection by centrifugation.

The materials chosen for this project, the gold and silver, are guided by my predilection for using precious metals, symbols of the eternal light and shadow. The use of colour, through turquoise and orange pigments helped to highlight the fragility and organic origin that inspires me.

Looking at the jewelry made for this project, shows the connection between opposites, between the subjective and the objective, the idea of effect and object, between the internal and the external, thus forming a single indivisible and universal being, representing in one way, the material and the immaterial.

Miriam Camarillas Marimon, lo subjetivo y lo objetivo, entre la idea y el objeto, entre lo interno y lo externo, formando así un solo ser indisoluble y universal quedando representado de algún modo lo material y lo intangible.

Miriam Camarillas Marimon

Models Tangibles

Miriam Camarillas Marimon



S138 VERDE ADN PHI (One piece) · silver patina 925 CT

Alicia Guash Mitjans,

Responsible for automated crystallography platform of PCB (scientific park of Barcelona)

During the course of this work our objective has been the transformation of the virtual image in a solid model. The invisible world of molecules coincides with the world that our senses can perceive when we hold one of them in our hands. In that way was born the name of *Tangible Model*, we began from atomic models obtained in our laboratory and accompanied in their own creative process.

The journey of these representations began in 1953 with the interpretation by James Watson and Francis Crick from the experimental work obtained by Rosalind Franklin. By x-ray diffraction of DNA fibers with the laboratory materials that they had at hand (copper wires subjected to laboratory clamps), followed in 1960 by Max Perutz and John Kendrew's representation of the first protein model, the hemoglobin, using 183 feet of brass wire supported by 2500 steel rods.

In 1978 was developed the first «Frodo» program, who allowed to display these models on a computer, and is continued until today that any home computer can instantly play one of these models based on the values x , y and z of their Cartesian coordinates.

In the last 50 years there been a great human and economic effort by scientists from different countries to elucidate the structure of the macromolecular forms. Which began in isolated laboratories as a handmade diffractions by x-ray became in macro-projects, developed by consortial associated laboratories. At the same

time as the structures are revealed, they're introduced into a virtual database PDB (protein Data Bank) for free access. The dimensions of these atomic models are in the order of hundred million part of a centimeter (0.0000001 cm) to bring them to a level detectable by our senses; we must multiply 10 cm by a billion.

The development of the space capacity in the human brain walks together with the performance of all senses. The use of visual sense in the building of the molecular models, supported by the digital information that computers provide, gives us an access to an abstract space based on the scientific and technical learning.

This road is long and costly, may facilitate the understanding of the macromolecular structures by the use of other senses such as touch, on the nerve endings of the fingers reveals the molecular space, exploring with our hands the intricate and labyrinthine forms that the chains forms.

The expansion eye sense touch technology provided by RLT (radio proto taping), where the material can be cast to shape was synthesized nylon Gold metal. By bringing these structures to the sensory world has produced the separation of the underlying concept of beauty which is usually linked to symmetry. Hardly say that a beautiful face is asymmetrical, and a body that does not meet certain proportions is harmonious.

With the atomic structures it is the same, as well as the double helix of DNA with 10 bases per 360 ° of rotation shows a symmetry harmonic and matching, not so with the protein where the pitch of its helix does not match any numerical proportion, giving a more visceral than harmonic.

Early in the process dominated the scientific component; the value lay not in beauty but in the concept

that hid the structure, so the tetramer of hemoglobin offered us. A sort of cathedral in miniature where the wonderful union of the oxygen atoms grasps.

The concept of beauty dominates; having one of the pieces in their hands we can see a tangle of twisted wires, as if it were a bowel.

For this reason, on our way to find aesthetic spaces, decrease the value of the beauty concept, and focus our attention on the symmetric models, this area provided us the structures of viruses, those, with their hexagonal and pentagonal heads (as soccer balls) opened us the doors to a converged spaces of symmetry and harmony.

At that moment, another door opened and gave us the way to the value of the symbol. Symbols who have joined us since the beginning of time, in a explicit Gold implicit way.

DNA leads to intersect the snakes in the caduceus, Gold the escolapian rod .The atomic structure of DNA created a new framework: a window, trough we see the transmission of life. Today, the snakes have disappeared in our urbanized and sophisticated nature, but it returned to us in the form of DNA, reminding us the transmission path of life.

The macromolecule with circular structure that we chose for this work, corresponds to the protein site, the front entrance of the virus «phi 29», the reason, quite simply, the familiarity obtained with the crystallization and the resolution of their structure in a process that for the last 4 years involved a solid team of well trained

people. It was almost a maternal process, a dark gestation at first, who grew to a virtual model scientifically validated, almost inch by inch with RTL technologies, and plaster models.

The huge number of atoms, about 50,000, which form the molecule, made it easier to work with maps of the surface of the macromolecule, giving more Gold less the detail function of the metal resolution.

I remember the moment that I first had one of these pieces made from silver in my hands, how we closed a cycle that begun 14 years ago with the crystallization of the macromolecule, as if the structure shown us the way. The DNA sequence chosen in this study corresponds to the coded to one of the twelve subunits of the macromolecule, while during viral in the cell, is passing through the centre of this. It is difficult to remove the symbolic beauty of the whole, a circular structure made up of twelve protein identical subunits and a worm shaft in the centre carrying the information to form a new heaven unfold.

Alicia Guash Mitjans

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*Render image of the capsides,
conector and DNA of the
macromolecular DNA PHI29,
courtesy from Laboratori del
Parc Científic de Barcelona*

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ADN PHI III

Ring created from crystal structure from the macromolecular DNA PHI29.

Collection «Modelos Tangibles», Barcelona, 2011

2,7 x 2,3 x 1,5 cm

15,35 gr

White patina on silver 925 ct

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ADN MOEBIÜS I

Pendant created from crystal structure from the macromolecular DNA PHI29.

Collection «Modelos Tangibles», Barcelona, 2011

1,84 x 2,74 x 3,20 cm

15,35 gr

White patina on 925 ct silver, 750 yellow gold and iron

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ARR216 ADN MOEBIUS · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



PB02 CAPSIDE EXT ORIGEN · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



PE193G CAPSIDE · *silver patina 925 CT*

Models Tangibles

Miriam Camarillas Marimon



Models Tangibles

Miriam Camarillas Marimon



CAPSID PHI29

Ring created from crystal structure from the macromolecular DNA PHI29.

Collection «Modelos Tangibles», Barcelona, 2011

1,93 x 2,10 x 3,10 cm

12,60 gr

Green and orange patina on 925 ct silver

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PIN01 CAPSIDE INT ORIGEN · *silver 925 CT*

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Miriam Camarillas Marimon



PIN04 CORONA · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



PIN02 ADN ORIGEN · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



PIN03 CAPSIDE INTERIOR · *silver 925 CT*

Models Tangibles

Miriam Camarillas Marimon



ARR218 CORONA · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



S134 CORONA (One piece) · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



S137 PLA CONECTOR · silver 925 CT

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ARR219 PLA CONECTOR · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



ARR214 CONO ADN PHI · *silver patina 925 CT*

Models Tangibles

Miriam Camarillas Marimon



ARR215 CONO DOBLE ADN PHI · *silver patina 925 CT*

Models Tangibles

Miriam Camarillas Marimon



S132 ADN PHI · *silver patina 925 CT*

Models Tangibles

Miriam Camarillas Marimon



ADN PHI II

Pendant created from crystal structure from the macromolecular DNA PHI29.

Collection «Modelos Tangibles», Barcelona, 2011

1,28 x 1,28 x 52,30 cm

9,46 gr

Green and orange patina on 925 CT silver

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ARR217 CONO DOBLE GRUESO ADN PHI (One piece) · silver patina 925 CT

Models Tangibles

Miriam Camarillas Marimon



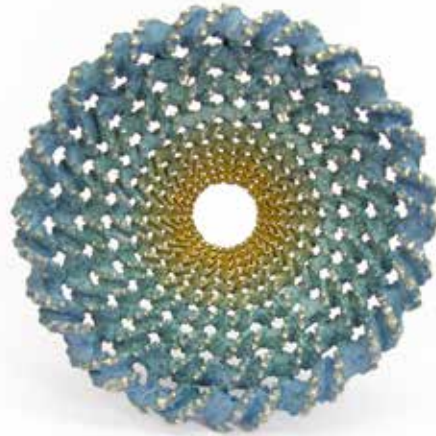
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Models Tangibles

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EPICENTRO ADN PHI

Pendant created from crystal structure from the macromolecular DNA PHI29.

One piece, collection «Modelos Tangibles».

Finalist certificate, *ARTFAD 2011 Awards*, Barcelona, 2011

0,72 x 4,95 x 4,96 cm

28,79 gr

Green and orange patina on 925 CT silver

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ARR213P ADN (2 rounds) · silver 925 CT

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Miriam Camarillas Marimon



S130 ADN (4 rounds) · silver 25 CT

Models Tangibles

Miriam Camarillas Marimon



S131 ADN (2 rounds) · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



S133 ADN (1 round) · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



PUL015 ADN (2 rounds) · *silver patina* 925 CT

Models Tangibles

Miriam Camarillas Marimon



ADN MULTIPLE

Pendant created from crystal structure from the macromolecular DNA PHI29.

One piece, collection «Modelos Tangibles».

Barcelona, 2011

6,94 x 5,27 x 2,65 cm

62,73 gr

Green and orange patina on 925 ct silver

Models Tangibles

Miriam Camarillas Marimon



PUL014 ADN (4 rounds) · *silver patina* 925 CT

Models Tangibles

Miriam Camarillas Marimon



PE195 CONECTOR · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



ARR220 PLA CONECTOR · *silver* 925 CT

Models Tangibles

Miriam Camarillas Marimon



PE189 ADN (2 rounds) · *silver patina 925 CT*

Models Tangibles

Miriam Camarillas Marimon



Models Tangibles

Miriam Camarillas Marimon



ARR212 ADN (4 rounds) · silver 925 CT

Models Tangibles

Miriam Camarillas Marimon



ARR216 ADN MOEBIUS OG/AG (4 rounds) · silver 925 CT

Models Tangibles

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ARR223 ADN (6 rounds) · silver 925 CT

Models Tangibles

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Models Tangibles

Miriam Camarillas Marimon



S135 CORONA · silver 925 CT

Models Tangibles

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Personal details

Miriam Camarillas Marimon (Barcelona, 1976)

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Professional training

- 2013 Course of sacred geometry form and concept.
- 2011 RhinoGold 3D Design Course.
- 2006-2008 Study of the form with the sculptor Marin Ana Galvez.
- 2002 Techjewel. Rhinoceros 3D design course.
- Course 2001 monograph creative jewellery Silvia Walz at the Escola Massana.
- 2000 School Jewellers and Watchmakers of Catalonia, JORG. Drawing jewellery.
- 1999 School of Arts and Crafts in Barcelona, jewellery specialty.
- 1997-1998 School Jewellers and Watchmakers of Catalonia, JORG. High jewellery and workshop.

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- 1996 Superior School of Design and Art Llotja.
- 1994-1997 Apprentice jewelry workshop Altimir Lluell
- 1993-1994 School of Art and Design Massana

Professional experience

- 2006-2014. Creation of the second workshop and gallery in Gràcia, Barcelona. Retail and wholesale nationwide.
- Jewelry Design 1998-2001 per Alza Barcelona.
- Creation of the company 1998: GdeJoies, creation and manufacture of jewelry.
- 1998 Opening of the 1st workshop-gallery in Barcelona.

Exhibitions and fairs

- 2013 Exhibition creative processes, gallery G Joies, "tallers oberts Gràcia".
- 2012 Participation awards Inhorgenta, Munich.
- 2012 Koetània Gallery, exhibition tangible Models, Barcelona.
- 2011 Participation in the contest Enjoia't FAD.
- Participation awards ARTFAD 2011, Barcelona. Finalist diploma in the professional category.

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- 2011 Exhibition Collection Tangible Models "Joies a la carta" in JOYA through publicacions yearbook. Barcelona
- 2011 Exhibition Inhorgenta collection Tangible Models through publicacions yearbook. Barcelona Munich.
- 2011 Exhibition Tangible Models Iberjoya collection through publicacions yearbook. Madrid.
- 2011 Gallery Meko, l'aparador de la diversitat, Barcelona.
- Tangible Models 2011 Exhibition, Gallery G Joies as part of Science Week.
- 2010 Exhibition The spiral: the creative process, G Joies gallery, under "Tallers Oberts de Gràcia".
- 2009 Inhorgenta fair, Munich.
- 2008 Inhorgenta fair, Munich.
- 2008 Exhibition "Joies a la carte" "JOYA".
- Iberjoya Fair 2006, Madrid.
- 2005 Modafad, Barcelona.
- 2000-2004 Sebime fair, Menorca.

Teaching

- 2010 collaborates with Escola Massana and the Escola d'Art of Treball, with the practices of alumnes jewelry.
- 2007 Course design and industrial development of crafts Chordeleg area. Esquel Foundation.
- 2006 collaborates with Handwerkskammer für München und Oberbayern practices with students of jewelry.

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Publications

- 2012 BTV "connexió Bcn" 02/03/2012
- 2012 BTV TV midday news
- 2011 Yearbook duplex group
- 2011 Newspaper Contrast Arte y Joya
- 2007 GZ Art + Design Magazine
- 2007 Arte y Joya Magazine
- 01 Onze magazine
- 2001 B-guided Magazine
- 1999 Arte y Joya eurodesign Magazine

