

Bio Corallo: A New Biomaterial for Digital Craft and Architecture

As digital fabrication methods expand their reach, the palette of materials available to designers often lags, dominated by synthetic, energy-intensive substances. Bio Corallo challenges this paradigm. Developed by [Ana Bridgewater](#) during her Master's in Parametric Design, this project introduces a new ceramic composite that places ecological thinking at the core of digital craft.

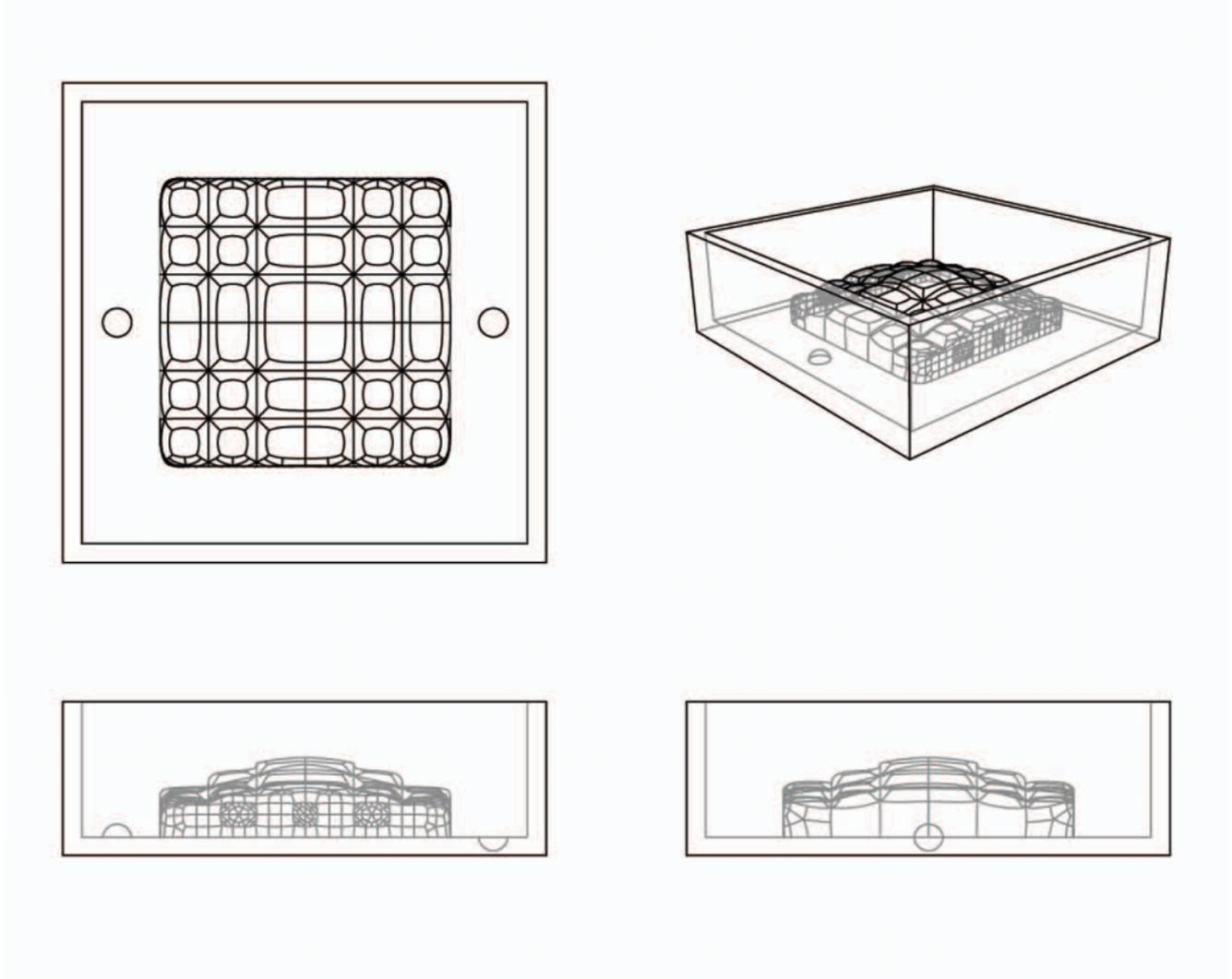


RETHINKING CERAMICS THROUGH BIOMATERIAL LOGIC

Ceramics have long been celebrated for their fire resistance, non-toxicity, and permanence. Ana sought to push these qualities further by developing a biomaterial that could be structurally expressive, environmentally aware, and digitally adaptable.

Bio Corallo is composed of porcelain slip and tapioca starch—a combination that carbonises in the kiln, releasing mostly water vapor and trace amounts of CO₂ (filtered to ensure breathable air), while leaving behind a micro-porous internal structure. This reaction reduces material mass by over 45%, resulting in a lighter component with preserved translucency and form.

The added benefit is that this system achieves the same volume using less than half the ceramic input, lowering the reliance on mined materials and making the process more sustainable.



FROM MATERIAL RESEARCH TO DIGITAL FABRICATION

This research was initially part of Ana's final design studio at [Controlmad's Master in Parametric Design](#) in Madrid. It involved extensive slip-casting and firing trials to test how the tapioca would behave when exposed to high heat. Ana documented these experiments rigorously, refining a repeatable formula that produced reliable structural outcomes. Parallel to the material research, Ana developed modular geometries using [Rhino](#) and [Grasshopper](#).

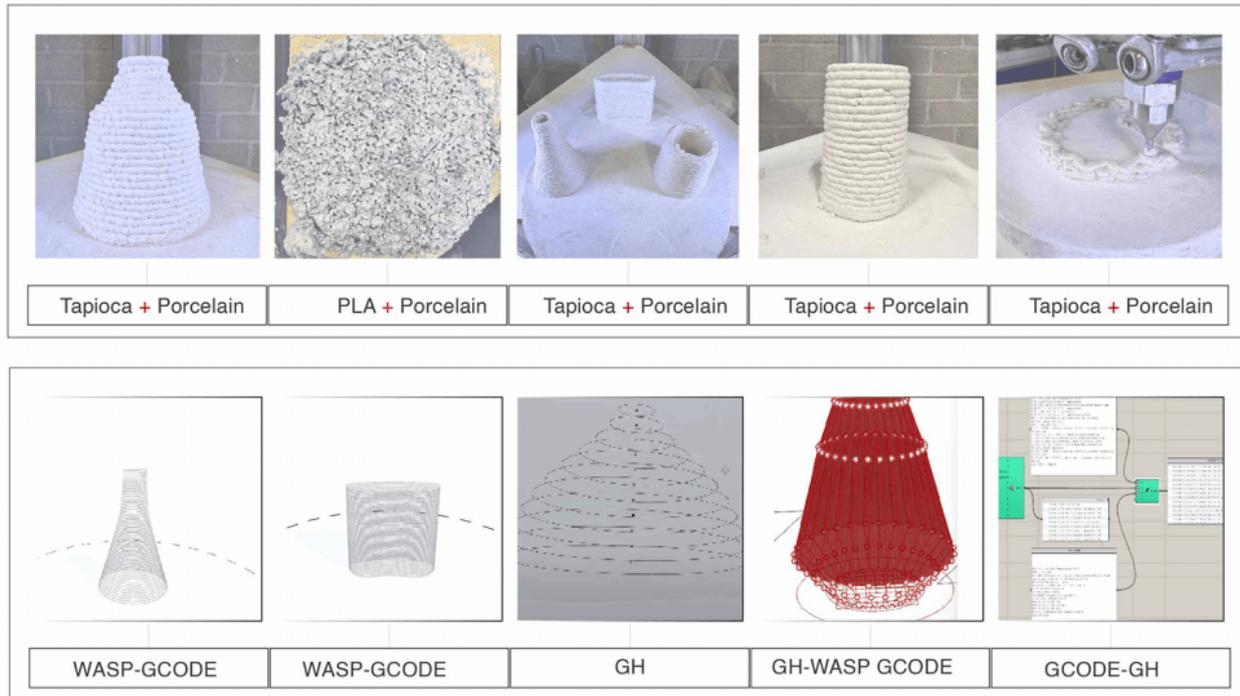
She explored ancient Mayan and Indian architectural motifs as reference points, building a repeating light module that could serve both architectural and sculptural applications. Through C# scripting, she programmed parametric logic into the modules, controlling void ratios, connection points, and structural behavior in response to

environmental or spatial constraints. The scripts were developed in part with the assistance of ChatGPT, helping Ana bridge her background in visual craft with advanced digital workflows.

ANA BRIDGEWATER

abalon

Corallo BioPorcelain
Testing for 3D printing -coiling



CRAFTING LIGHTNESS, STRUCTURING LIGHT

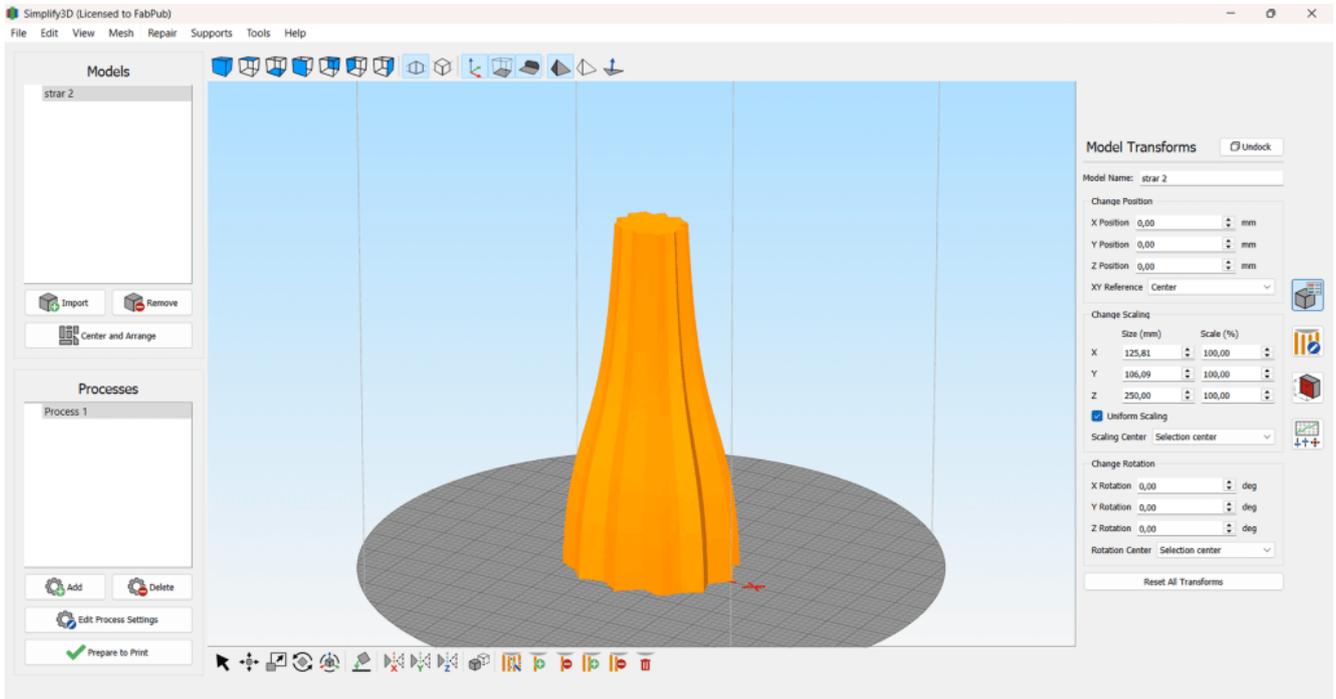
As part of the exploration, Ana tested the material's performance with light, looking closely at diffusion, texture, and structural expression. The carbonized voids in the ceramic allow subtle transmission of light, making Bio Corallo especially suited for lighting elements, wall screens, or cladding systems that double as atmospheric filters.



[See Also](#)

[SUBD IN RHINO 7 & 8](#)

The modules were developed for repetition and scalability. While the original plan was to fabricate the elements using a ceramic 3D printer at [Lowpoly](#), Ana adapted her method after relocating to London. Without access to ceramic printing, she designed and produced PLA molds using digital fabrication and cast the pieces by hand. This shift not only kept the project alive but also introduced new opportunities for form accuracy and finish.



FACING THE UNKNOWN

Working with an organic additive like tapioca presented major challenges. Kiln results varied widely depending on environmental conditions. Ana resolved this by conducting controlled small-batch tests and documenting the variables meticulously. Another hurdle came when she lost access to the 3D printer. Rather than abandon the project, she restructured her fabrication approach using digitally generated molds—a pivot that maintained her design intent.

Perhaps the most personally transformative aspect was learning to code. Coming from a hands-on background, Ana leaned on AI support to learn C#, ultimately enabling her to automate and expand her parametric models.



RECOGNITION & OUTLOOK

Bio Corallo was selected as one of the four most experimental lighting projects of the year and exhibited during Milan Design Week 2025 at Isola. It drew praise for its structural originality, tactile expression, and environmentally conscious methodology.

Though still under development, the project continues to evolve. It points toward new possibilities for designers interested in combining material stewardship with computational creativity. Whether used in architecture, interiors, or lighting, Bio Corallo embodies a growing need to rethink what we build with—and why.



TOOLS & TECHNIQUES

- Rhinoceros 3D – base geometry, SubD modeling, modular systems
- Grasshopper – parametric control and geometric adaptation
- C# scripting (via ChatGPT) – for rule-based module logic
- Hand-mixed ceramic techniques – slip casting, kiln carbonisation
- Material – porcelain slip and tapioca starch
- Electric kiln – controlled firing environment
- 3D printing (PLA) – digital molds
- AI – for render post-processing and presentation
- Photography – material documentation and form studies



CREDITS

Lowpoly Studio – internship and ceramic 3D printing access

Isola – showcase Bio Corallo during Milan Design Week 2025

Tutors at ControlMAD – critical feedback and design guidance

Fab.Pub team in London – studio support

Abalon studio team & collaborators – technical exchange