Synergy of Alginate
and Natural Fibers

# Design meets Alginate

## *Synergy of alginate and natural fibres*

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The embodied carbon emissions from building materials and construction are today responsible for 38% of annual GHG emissions in the current global environment. If we are to reach the European energy plan with net-zero emissions by 2050, now is the time to rethink our construction principles, as well as building elements and materials.

One of the possible steps to achieve this goal is to explore new solutions using regional sources and sustainable raw materials. In our research, we use alginate to see if we can substitute conventional building elements with others based on this sustainable material, whose potential in architecture is so far unrevealed. Alginate, which is found in brown algae cell walls, is an irreversibly hardening elastic moldable material, i.e. once hardened, its form can neither be changed nor converted back into an original state.

Through a five-day workshop, students of material engineering, architecture and design had the opportunity to explore the possibilities of using alginate composites as building materials through a series of experiments. Taking into account the tendencies of the natural behaviour of macroalgae (from which alginate is obtained), but also experimenting through the synergy of alginates and different types of natural fibres (cellulose, mineral and protein), elements with the different designs were obtained. The results of the workshop were presented at the Museum of Science and Technology in Belgrade from, February, 25 - 3, March 2022.

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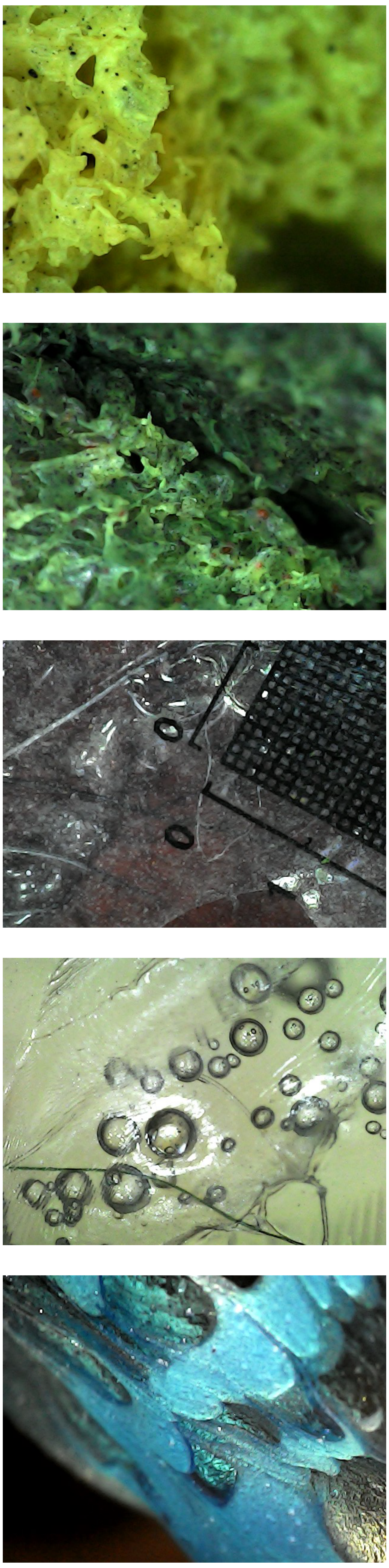

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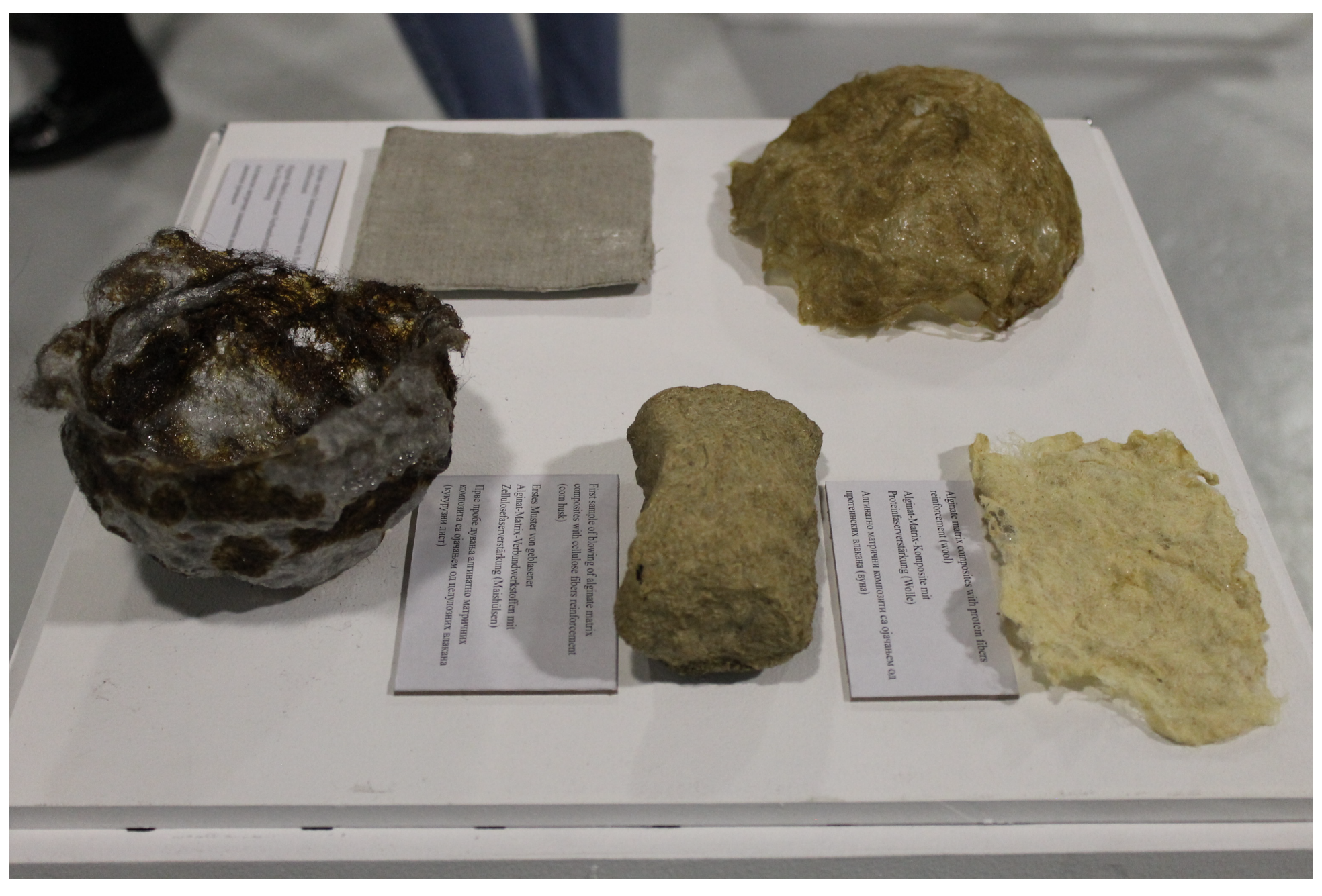

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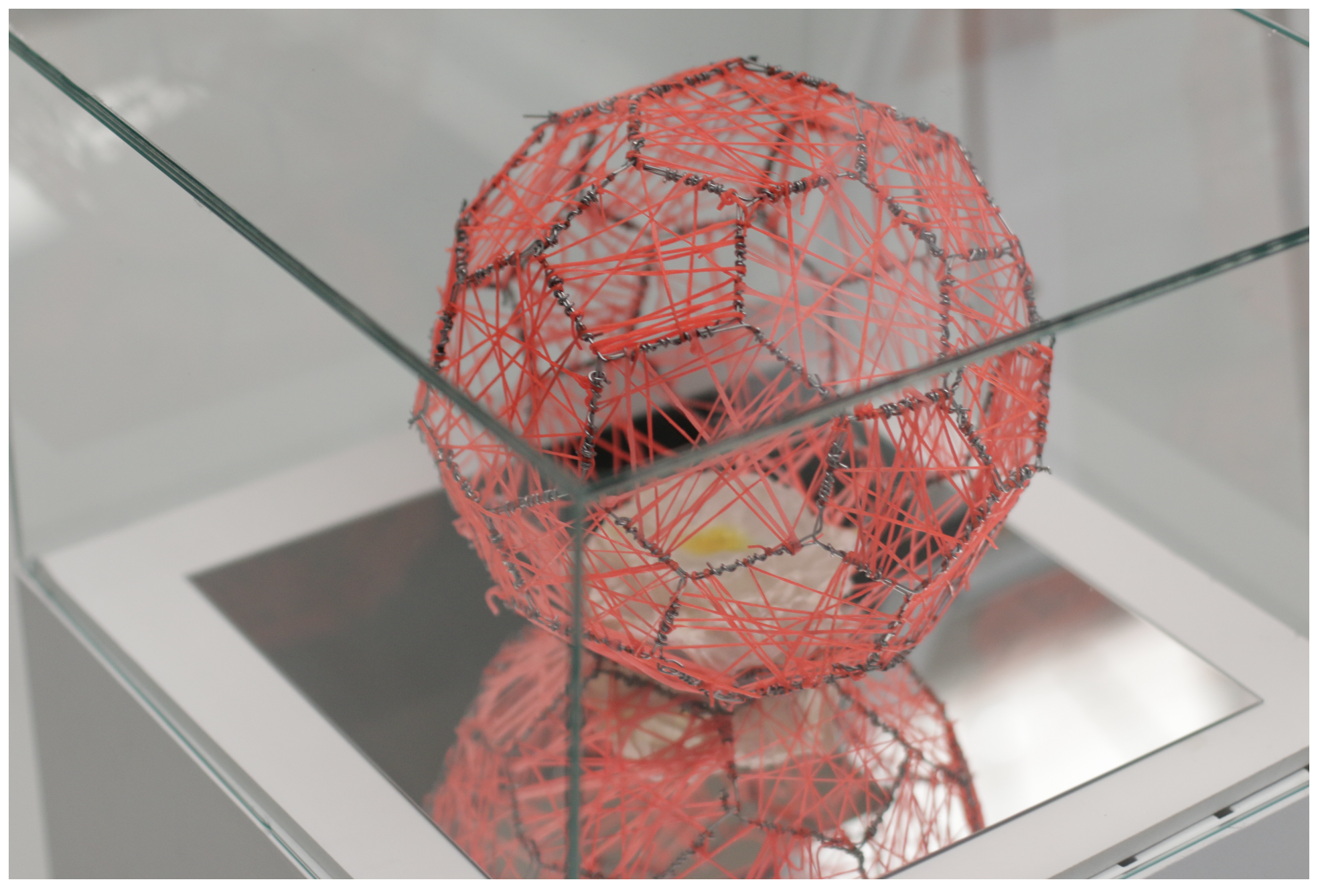

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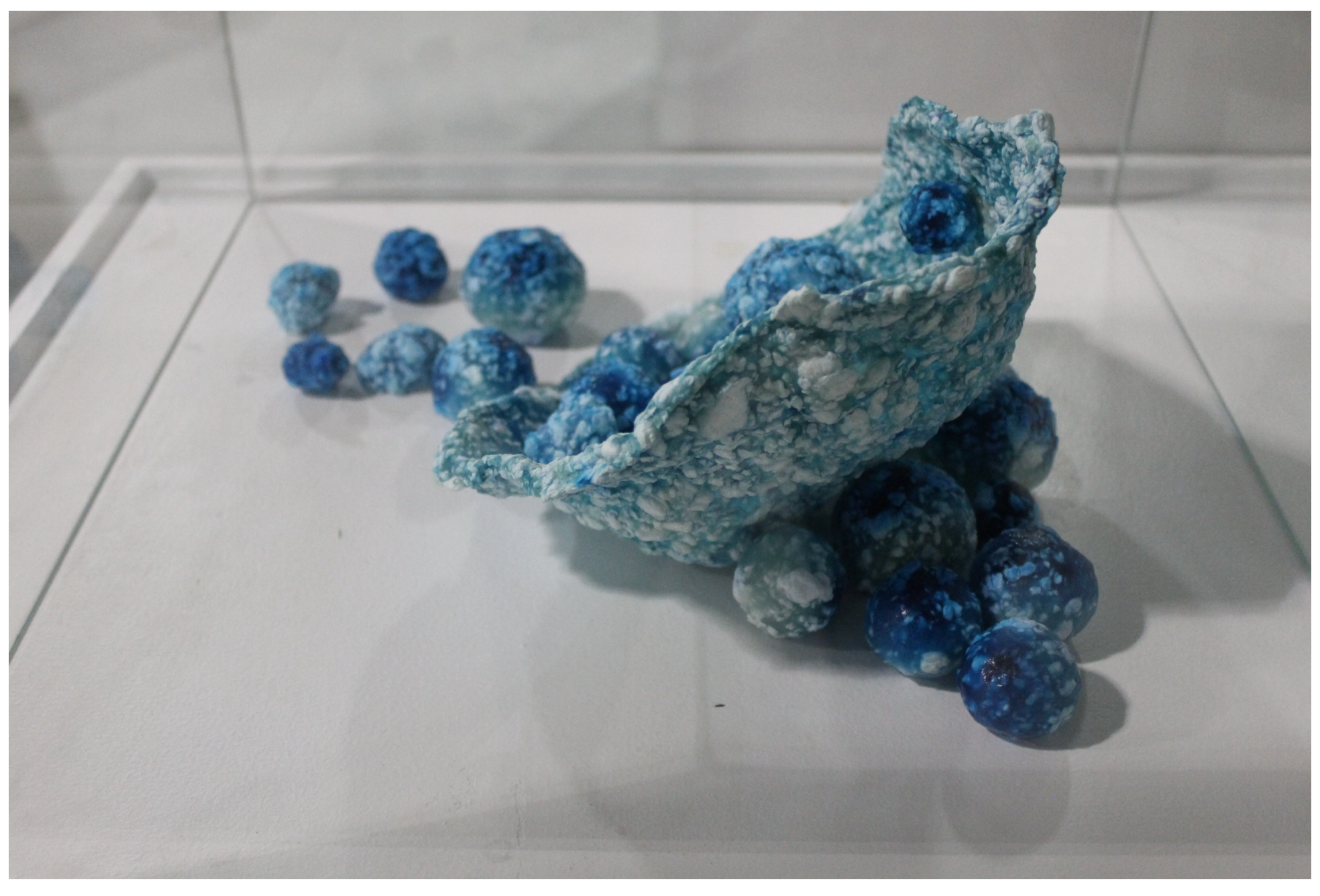

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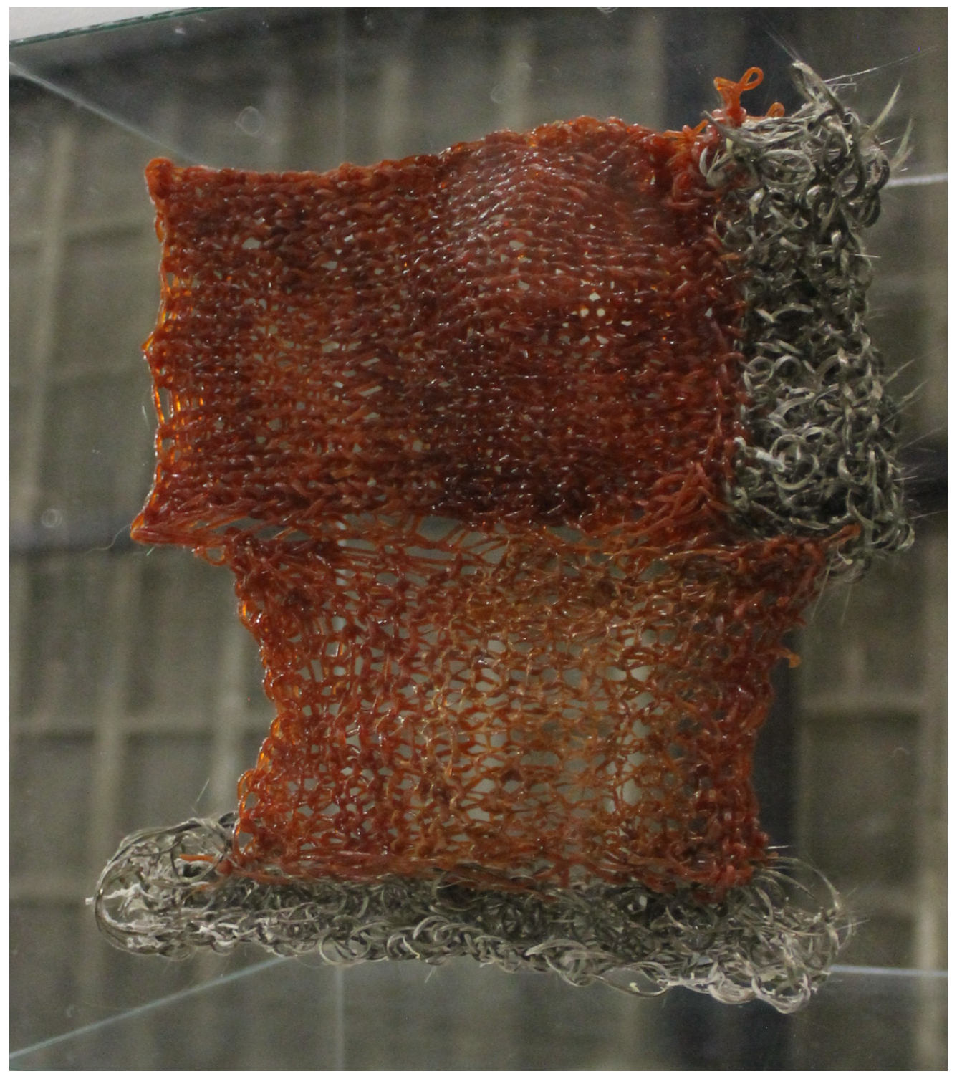

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*1) microscopic images of different materials / alginate expansion, composites,...*

*2) exhibition set up: Belgrad, Museum of Science and Technology, February 2022*

*3) alginate sheets: experimenting with different mixtures of alginates led to the idea of making thin films. The idea for the further work is to determine the application to the packaging.*

*4) material samples: alginate matrix composites with protein fibers reinforcement (wool), alginate matrix laminate composites with flex reinforcement, first sample of blowing of alginate matrix composites with cellulose fibers reinforcement (corn husk)*

*5) truncated icosahedron lamp: long alginate strings were wrapped around a zinc coated low carbon steel polygonal sphere creating an intricate and colorful light fixture. The alginate net casts an interesting shadow on its sorroundings.*

*6) ductility: the composite material used was created using alginate, fabric made from wood pulp, wood sawdust, and corn husks, forming unique biomorphic shapes.*

*7) colonisation: the composite is made of cellulose cotton fibers, cellulose fibers from wood pulp and alginate.*

*8) knitting structure: alginate + chitosan*

*9) first experiments: samples of diffrent forms and additives*

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