

BLCK VLVT: A SOLAR PANEL PAINTED WITH THE COLORS OF A PLANT ACROSS ART AND SCIENCE

This is a story about the solar panel Blck Vlt that connects a plant to an iconic painter, and a physicist to an artist. It evolves in Aalto University since 2016 involving artist Bartaku, physicist Janne Halme and researchers from various schools and labs of Aalto University.

Blck Vlt is a hand-painted solar panel based upon JMW Turner's painting *'Snow Storm—Steam-Boat off a Harbour's Mouth making Signals in Shallow Water, and going by the Lead. The Author was in this Storm on the Night the Ariel left Harwich (Exh. 1842)'*.

In the centre is a plant, *Baroa belaobara (Aronia m.)*.^[1] The colorants in the solar panel painting originate from its leaves, fruits, and stems and are the main resource for the transforming of light into electrical energy. The artistic inspirations of the work lie at the *Aronia m.* plantation in Aizpute, Latvia, whereas its scientific and technical aspects originate from the research of dye-sensitized solar cells. A 15-minute documentary film directed by Nina Pulkkis tells the story ^[2]:

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LIGHT IN DIALOGUE WITH THE COLOURANTS.
TRANSFORMATION PROCESS INTO ELECTRICAL
ENERGY THAT THEN GOES TO A LIGHT
SOURCE, AND LED, THAT THEN SHINES ON THE
REPRODUCTION [OF THE ORIGINAL PAINTING]
WITH ITS AESTHETIC ENERGY. THAT GOES TO THE
HUMAN BRAIN THAT CREATES SOME ENERGETIC
SPARKS BETWEEN THE SYNAPTICENTITIES IN THE
BRAIN. GIVES PERHAPS ALSO SOME FEELINGS,
SOME EMOTIONAL ENERGY.

The authors met in 2017 when Bartaku was organizing a course and invited Janne to speak about the solar cell technology that he had been working on already for long. However, what came first is Bartaku's artistic research that started around 2007, called *'The Undisclosed Poiesis of the Photovoltaic Effect'*, where he started doing research into the relation of light, energy, and bodies.

Talking about his work in the Midwest of Latvia whilst organizing a workshop, the local people who heard about his work pointed him to a plantation: "If you're interested in dark natural colours, we have here an abandoned plantation of a berry that produces very dark juice that might be interesting for your work." They took him to that plantation which turned out to be an *Aronia m.* plantation (in Finnish marja-aronia). He started to use the dark colourants of that fruit in experiments and public works as the main agency that converts light into electrical energy in all kinds of experimental devices.

At some point, walking at the plantation, as he annually has been doing since 2009, there was an epiphanic moment when he understood that he had to be the one that would connect the relation that the plant has with light, energy, and colour, to a painting of an iconic art master. Somehow, he understood that this human art master should be William Turner, and the painting became the *'Snow Storm...'*, chosen for its colour palette that matches well with the colours of the *Aronia* plant.

With these beginnings, Blck Vlt evolved through an artsience co-creation process as a part of Bartaku's Doctor of Arts

dissertation and within the artsience group *Aronia Art Morphing (Aamo)*. The work was supported by a grant from Aalto University's Multidisciplinary Platforms.

Janne:

I was excited about the opportunity to work with an artist and made a good connection with Bart. I first took the project as an interesting way to challenge our skills in the dye-sensitized solar cell technology and assumed a very specific, engineering role in the team. Earlier, we had shown that it is possible to inkjet print the dyes into this solar cell in the form of an image, and so, in a rather straightforward way, we thought that inkjet-printing different dyes extracted from the *Aronia* plant would allow to accurately reproduce the Turner painting as a functional solar panel. Pushing our solar cell printing skills further was also a way to me to justify the time and effort I would spend on this project – a way to define clear research questions and engineering goals that my academic peers would understand, and to produce results for scientific publications.

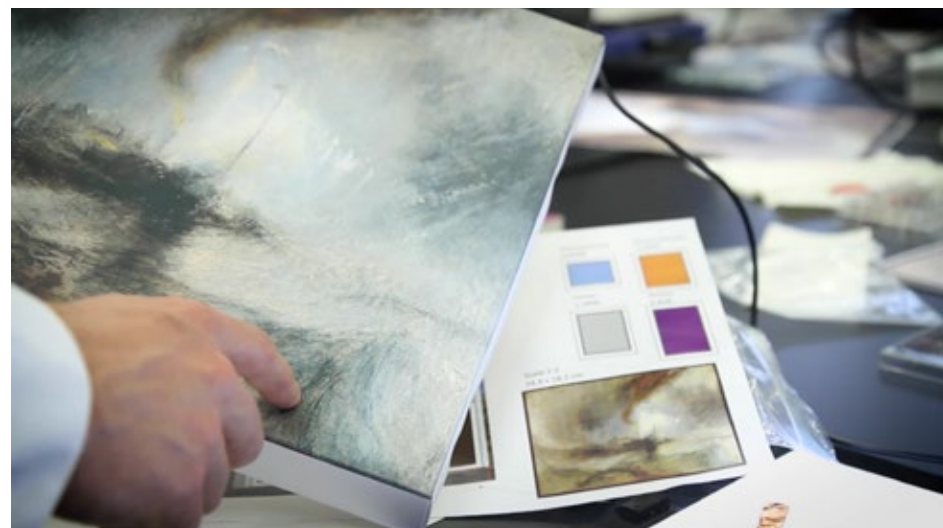
Gradually, however, things started to shift. I became more and more interested on the philosophical thinking that circled in our meetings – the richness of perspectives that arise when the scientific and techno-economical thinking meets artistic and philosophical thinking. A curiosity rose to venture deeper into the dialogue between art and science, and to personally cross the discipline borders. This shift in thinking came concrete when we ran into technical difficulties with the inkjet printing and realized

how much work it would require solving them. I realized that I had been trapped in a technical mindset, an engineering bubble, that made no sense in the context of this project: why should we even try to print the dyes when we could simply take a paint brush and paint them on the solar cells, like Turner did. We tried it and it worked perfectly.

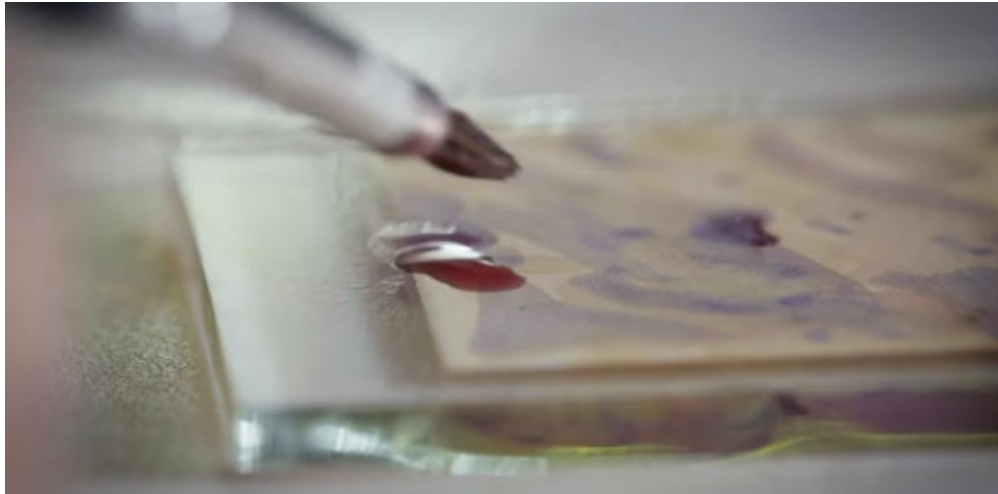
This moment marked for me a transition to a new freedom of thinking and doing. I had understood the power of simple solutions already for a while, but the freedom to evaporate the discipline boundaries at the personal level was a new, refreshing turn and has since been a great source of joy for me. Still, I feel the ghosts behind my back, haunting: What will you bring to science from this? How will you benefit engineering with this? I have no answer. But right there, in the flowing without knowing, in the odd fears of being misunderstood while not even understanding yourself, in the careful observing and following intuition, and the playful questioning, I see a new space and ways for artistic and scientific explorations and, possibly, discovery.

Bartaku:

We are often asked about the efficiency of these solar cells. For me, it was never about the efficiency of these colourants, or how long they live or are active or functional. I was much more interested in the poetic aspects of this fragile technology that relates to the speculative narratives about the eternal access to electrical energy. This fragility is a limitation that invites us to go deeper into the connecting with the plant and its symbiotic endophytic organisms.



Making Blck Vlvt. Still footage from the documentary film directed by Nina Pulkkis, Fotoni Film & Communications (2020). [2]



These colorants change when used and exposed to light. The context of eternal change, morphing, is interesting to me. Our solar cell painting will evolve over time in terms of electrical output and aesthetic output, while Turner's work is still considered iconic 200 years after it was produced in 1842. All these tensions between aesthetic energy, electrical energy, the notion of art, and perception over time – to me it is an interesting field of tension that might create transformational energy in itself.

Blick Vlt currently lives on through the *Painting Energies Podcast* [3] hosted by Bartaku and Halme. It is a series of conversations on light, colour, plants, microbes, and electrical energy, that explores their relations through a dialogue between science, technology, art, and philosophy. Blick Vlt further evolves through the exhibition series *Towardless – Plant-based Electrical and Art Energy*, where the authors presented, in addition to Blick Vlt, objects from their solar

cell research archives as photographs and installations [4]. The exhibition was shown in the X-Festival 2021 at Hasselt University, Belgium, where Halme and Bartaku also gave a Studium Generale speech. They continue to work together.

This article is partly based on the interview of Bartaku and Janne Halme by Nina Pulkis in the short documentary film Blick Vlt – the hand-painted solar panel inspired by a JMW Turner painting [2].

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