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The Integration of Nanotechnology Research into Fine Art: The Polymorphic Impression by Uršula Berlot

Uršula Berlot held her exhibition *Polymorphic Impression* in the UGM Studio Gallery in Maribor between 27th January and 25th February 2019. From the artistic aspect this exhibition recontextualised images that were created with the aid of electronic microscopy and crystallography in the research of materials linked to geometric modelling of crystal networks. The exhibition dealt primarily with the visual aspects of techno-images, i.e. images that are produced by machines and which demand (at least implicitly) cooperation between the creators of the images created with the machine and the user who includes the images into their work process. The concept of technological images was developed by Vilem Flusser, as he explains it in his unpublished monograph *Umbruch der menschlichen Beziehungen (The Turn in Interpersonal Relations, 1973–74*, which has been partially translated into Slovene in his collection *Digital Appearance*), where he introduced the distinction between elite and mass techno-images. Flusser's example of a situation in which elite techno-images are being created, is an x-ray image, the two-dimensionally coded records of which are used by doctors for diagnostic purposes. In rare cases, when the image shows something unusual, which could be interpreted in different ways, they try to explain it by debating it with the creators of the image, but they remain within the context of finding appropriate treatment. In the so-called mass techno-images, i.e. ones created with the use of a photographic camera, video camera... the situation is the opposite, for in this case the unusual images become interesting in themselves – and this is their goal – they are viewed aesthetically, in a non-interested context, according to Kant.¹ By confronting images created with electron microscopes and other measuring equipment used to research materials, the exhibition *Polymorphic Impression* addresses the same art problem

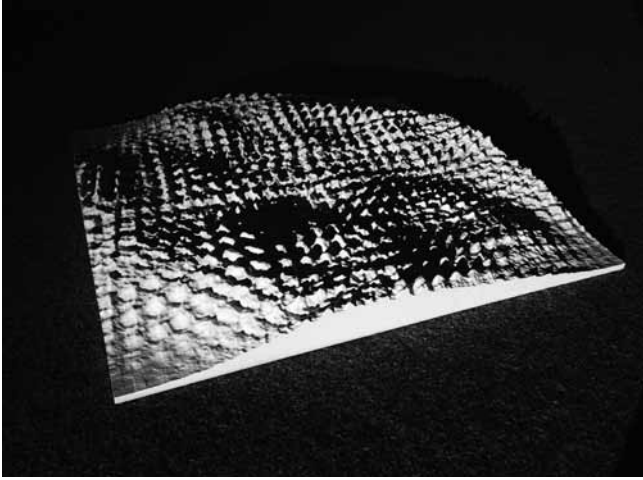
as Gerhard Richter in his works catalogued under 880-4, 882-7, the entire series 885 *Silicate* (2003) and the monumental 888 *Strontium* (2004) – linking it to his projects with glass surfaces, greys and works on glass² – or the series of projects, in which Narvika Bovcon, Vanja Mervič and Aleš Vaupotič participated, i.e. how to establish a bridge between reading a two-dimensional code within the contexts of research into materials and the field of visual art.³ We are thus dealing with the artist addressing the situation of elite techno-images – Berlot has established cooperation with the researcher and professor of microscopy Sašo Šturm (Department of Nanostructured Materials, Institute Jožef Štefan) – which transforms into a problematic situation relating to the receiving of mass techno-images, in which the audience at an exhibition observes digital images and projections and fails to take into account the complex procedures behind the automatic production of these visible signs. I do not think the importance of Uršula Berlot's exhibition lies in the use of images that were created using a process that researchers call measurements, but in the artist's solution to mediate them and thus establish contact between the visible and invisible; the nanotechnological research deals with phenomena that are at least five times smaller than the wavelength of light, which is why they are invisible in the medium of light.

An internet search using the keyword 'nanoart' reveals a chaotic mass of approaches, one of the more common ones is the process of colouring images that were created with the scanning electron microscope. What artistic approach to the so-called nanoart did Uršula Berlot opt for? Uršula Berlot's opus is slowly condensing into unique

¹ Vaupotič, Ales. 'Teorija tehno-slike Vilema Flusserja (Theory of the techno-image as defined by Vilem Flusser).' *Primerjalna književnost* 37.2 (2014): 151–163. <<https://www.dlib.si/?URN=URN:NBN:SI:doc-Y2B9LNI1>>.

² Gerhard Richter. *Catalogue Raisonné. 1993–2004*. Dusseldorf: Richter Verlag; New York, D.A.P., 2005. 233–249. It is interesting that Richter's characteristic painting technique of horizontal obscuring in the case of images of atoms is in the service of mediating what the painter saw, as the transmission electron microscope – due to the interaction of the electrons (and the two-dimensionality of the image) – shows the location of the atoms in the form of a special animated blur.

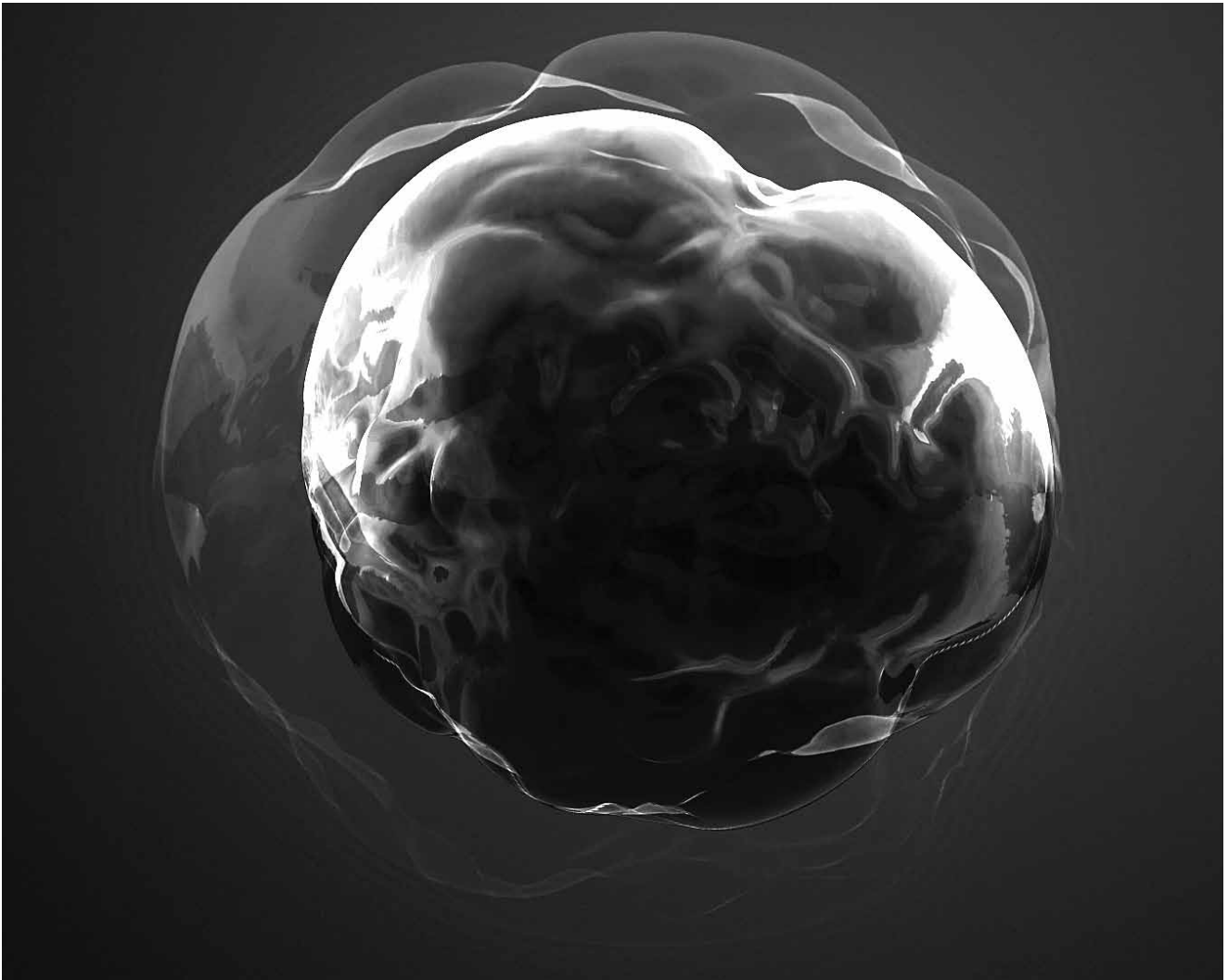
³ Murnik, Maja. 'Tehniške slike nanosveta (Technological Images of the Nanoworld).' *Likovne besede* 102 (2015): 64–67s



Uršula Berlot, *Polymorphic Imprint*, 2016, three-dimensional print,
photo: archive of the artist



Uršula Berlot, *Observatory: Carbon Nanotubes*, 2016, kinetic object,
photo: archive of the artist



Uršula Berlot, *Liquid Solidity*, 2017, screen image, sound: Scanner – Robin Rimbaud, 3-D animation: Sunčana Kuljiš Gaillot, 4 min. 49 s,
photo: archive of the artist



Uršula Berlot, *Polymorphic Imprint*, 2017, installation in the lower space of the gallery, photo: Damjan Švarc

and sovereignly outlined artistic research, which offers a well thought out answer to the posed question. From its very start, visual art has been tied to visual light and the signals of the visible that are necessarily transferred by the media, and both of these two poles are of great importance to the artist's creativity. When viewed from a distance one might believe that her works belong solely into the black and white spectrum, however a close inspection will reveal that light itself lies in the core of this opus. Uršula Berlot's paintings, which are sometimes formed within transparent gelatine on a transparent glass plate, are seen simultaneously as without colour and filled with all the colours of the world, which break and reflect from the smooth surfaces. The whiteness shines in the game of light and shadows, as the light in the dark or semi-dark spaces condenses in the focal points of the images-screens-mirrors-lenses. The video cannot be black and white, in the same way as a mirror or a transparent material cannot be. The black and white imaginary is in reality a starting point for the artist's research, some sort of a working hypothesis, the checking of which leads to a more generally accepted ascertainment. In one of Berlot's larger exhibitions, *Vanitas*, which was hosted in Equina in 2012, one thread of her hypothesis was elaborated through the thematization of the photographic medium, which was with a personal touch transformed into a co-called *camera oralis* – the image was projected into the artist's oral cavity and fixed in the medium within her. If we followed the theoretical media continuity, the logical consequence of photography would be film, but it is at this point that the consistency of the artist's research is

revealed. Berlot thematised her potential step in the direction of the medium of the film. One path led her towards technological images, including x-ray images, however, it seems that Berlot paid the same attention to the execution of the photogram in dynamic black and white video images, which every now and then seem like an abstract drawing in motion. For instance, in the exhibition *Pulsation/Cross-sections* which took place in the Berlin Künstlerhaus Bethanien in 2007, the disruptions and reflections of white light into a new dimension at the end of the exhibition opened the video as a radically different source of light. In this context the video had the function of a unique narrative, and at the same time this new medium transformed the narrative outlines into a holistic connection of visual art records. The later exhibition *Vanitas* had, through its main motif of a skull, formulated the logical allegoric (as Walter Benjamin understands allegory in the field of new media⁴) efflux of reflections in the reflexivity of the video medium. The principle of symmetry obtained by mirroring merged with the techno emanation of the skull measurements. Benjamin stated (alluding to technical reproductive art): 'From the viewpoint of death, life is the production of corpses.' *Memento mori*. We also need to mention the tactile-performative side of Uršula Berlot's opus, in which the artist included the fragility of her body into the subtle weaving of spatial installations created from materials, light and videos. The artist, similar to the visitors of her exhibitions,

⁴ Chapter Allegory and Tragedy in the book *Selected Essays*; this is a translation from the work *Ursprung des deutschen Trauerspiels (The Origin of German Tragedy)*, 1928).

entered a network of reflections, which – in the exhibition *Vanitas* – reached a temporary artistic conclusion while opening new artistic research questions.

The exhibition *Polymorphic Impression* showed a decisive step forward in her artistic research, which moved away from the allegorisation of visual art images and the videastic reflection of the play of light. The artist decided to move away from measurements in the creation of images – i.e. what we would usually imagine to see when we use electron microscopes – and turn towards mediating what she saw and understood as an image as a painter. For instance, there are two installations, shiny black geometric objects, into which the visitor peeks through small holes, next to the entrance to the gallery. Within the installations the visitors can see a simulation of the external view of nanowires, however, these are not real nanowires, but models that imitate their appearance. The audience thus views a simulation of the nanowires, and not the assumed actual two-dimensional record of the nanowires created by the electron microscope that the artist saw and experienced in order to mediate it. The spectator, who is not a user of electron microscopes or acquainted with this field, cannot judge whether this is an appropriate representation, for in order to do this he would have to be acquainted with the actual material base that Berlot has seen. The writer of this text was pleasantly surprised to see that the nanowires were precisely as he had imagined, even though they were slightly different – they were rightfully presented from the side as I imagined in my thoughts.⁵ So, what we have truly seen at the exhibition, could be wrongfully called an artistic ‘lie’. Why did the artist not show us the ‘truth’, the naked original materiality, as created by the scientific research machine? The answer to this seemingly artistic representational contradiction can be found in Flusser’s theory of technical images mentioned in the introduction, which states that the directness of the understanding of the flood of images, that are spat from contemporary multimedia devices, are an illusion and a mistake, for this is material that is incomprehensible to humans in the same way as the entire library of books that is available in digital form on a small screen of a mobile gadget is incomprehensible. Flusser always drew attention to the fake illusion of the directness offered by the seductive colourful techno-images, which in the actual attempt to understand appear in all its problemativeness. It seems that Uršula Berlot understands that the materials created by laboratory equipment and microscopes do not communicate on the level of visual art language, i.e. that the artistically coded techno-image is a product of the cooperation between numerous artists with various competencies, who manage to build a

visual artistic statement that makes sense only through dialogue – it is a result of the cooperation between those who understand the operation of, for instance, electron microscopes and their ways of recording the measured signals onto a two-dimensional surface through complex algorithmic calculations, and visual artists, such as Uršula Berlot, who have been addressing the issue of how light enters the field of visual art and in what ways can the artist control it, over a period of years. The impression in the exhibition *Polymorphic Impression* is not automatic – an emancipation of reality, as Roland Bathes calls the photograph in *Camera lucida* – but mediated through the visual culture that has accumulated in the visual artist, and it is her, who together with fellow artists – sound designer (Robin Rimbaud), 3D video modelling technician (Sunčana Kuljiš Gailot) and laboratory researcher – tames the masses of design arrangements through the media of computers, two and a half dimensional animation, three-dimensional print, video, digital prints, slide shows, spatial light installations and similar, in a way that is appropriate for human reception.

Of course, as a visual artist with the experience in nanotechnological measurements with electron microscopes, the writer of this text understands the objects presented at the exhibition in my own way. Maybe my understanding differs to that of the artist. The lower exhibition space reveals four digitally printed three-dimensional objects that are positioned on the floor and dynamically lit. I recognised them as a record of the location of atoms, as created by the electron microscope after treating numerous sources of contrast. Of course, it is always fascinating to see individual atoms (or their layout within a crystal network), which are one tenth of a nanometre apart. Similar as was the case with nanotubes, the artist once again interfered in the representation, mainly by metaphorically freezing the viewing process, which usually, with its heat, quickly dissolves the observed material, into an Alpine landscape, as seen for instance from an aeroplane – which might remind us of the late futuristic *aeropittura*, which changes the point of observing the landscape as artists fly over it in aeroplanes. I have always imagined landscapes on nano rocks as extreme landscapes, unfriendly to living beings, but which can, never-the-less, be populated by smaller beings – such a disposition is of course understandable from the perspective of the macroworld, for we see the space between the atoms, and the imagination immediately projects new contents into it, of course within the frame of the visions of the world on our rocks. What is more important is that this space reveals another important characteristic of the research that deals with technological images, especially those from scientific research, i.e. the fact that artists, apart from objects, prints and installations also offer explanations of their works to the visitors. In the guided tours of her exhibition, Uršula Berlot explained this installation

⁵ The miniature diorama is titled *2nd Observatory: Carbon Nanotubes*, however, I did not see them, which could be why they were more curved than the nanowires.

through two treatments of materials in measurements – visualisation of crystal structures: ‘We have an image that can be copied with the aid of the so-called Fast Fourier Transform [...] into the inverse or reciprocal space and that can be then copied back [...] When we change the information in the inverse space – which is more complex than the real space – we do this with the aid of filters [...] All four *Reliefs* were created on the basis of the original image, but they differ due to their partial views (reduction of information within the inverse space). Thus, they are in a way similar but also different.’ At the exhibition the artist has, alongside the visual art messages and the artistic context, also presented the language of the research, the world of concepts, and this enabled a view into the construction of

the matter that comprises this world on the physical level. This means that the visitor of this and similar exhibitions also has to show an interest, readiness, to take the step from being merely a visitor of an art exhibition into an analytical and mathematical mind that understands the models based on electron microscopes – an interaction that takes place in the form of a dialogue between various representation worlds. ■

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