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Lichtenberg Figures Assessed for their Aesthetic Potential

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My PhD research involves the documentation of diffusion-limited aggregation patterns and other 'self-authoring' systems. I assess these arrangements to appraise their artistic potential. In relation to geoscience, I study DLA patterns similar to those found in the manganese oxide that are found on the surface of sedimentary rocks. I visualise and document electrical breakdown patterns that display fractal properties. Electrical branching patterns are also observed in the surfaces of golf courses that have been struck by lightning. Fulgurites are made of fused sand and are found in a variety of geosystems. These electrical formations obey the Laplace equation.
I experiment with different materials to visualize the dendritic form in materials like lucite using lycopodium powders, carbon powder or iron filings. Using wooden and metallic constructions I have been charging up plastic surfaces with static, then dusting powders on the surface, thus visualising the invisible Lichtenberg figures left in the plastic. My photopolymer etchings are a direct visual representation of electricity. The usage of mechanical contrivances echoes Jean Tinguely and Francis Picabia's Neo-Dadaism. I have been studying the work of the German physicist Georg Christoph Lichtenberg. The Lichtenberg figures can be described by Maxwell's equations. The powder dusting method I used to make artworks is also used in forensic science. Not dissimilar to my process, forensic scientists use a device that generates static charge, and the charge draws the dust from the print on to the black plastic.
My PhD research topic includes extending German American materials scientist and physicist Arthur R. Von Hippel's (1898 – 2003) research into Lichtenberg figures. Von Hippel wrote in 1982 that he considered his art-science work incomplete.
My research includes the documentation of processes that demonstrate diffusion-limited aggregation such as the fractal patterning demonstrated in Von Hippel's experiments. Von Hippel notes: 'Future studies (into Lichtenberg visualization) will be able to use today's advanced color-photography as an additional source of insight – an enviable prospect' (Von Hippel, 1982). In collaboration with the schools of Art and Design and Engineering at Portsmouth University, I intend to build on existing research using modern photography to visualise electrical discharges. I plan on using aforementioned machines to produce sparks and then to document the electricity using long-exposure photography. I want to analyse the dimensions of the discharges to discover mathematical patterning.
In 1777, Lichtenberg discovered visual electrical discharges by chance using a foxtail and an electrophorus. He rubbed the surface of the electrophorus and fell from his ladder and as a dust cloud arose, it settled 'on the electrified surface in patterns of unusual design' (Von Hippel, 1982). I aim to recreate and build upon this process.

Reference

Von Hippel, A. (1982). Lightning Strikes in Other Worlds: The Wonders of Lichtenberg Figures. [online] Mrs.org. Available at: http://www.mrs.org/docs/default-source/Careers/arthur-robert-von-hippel-website/lightning-strokes-in-other-worlds.pdf?sfvrsn=0 [Accessed 12 November. 2018].