



Inventions represented at Danish IP Fair 2018

Advanced Materials and Technologies

This document contains one-pagers for all inventions within **Advanced Materials and Technologies** presented at the Danish IP Fair 2018. You can use this document to identify meeting partners at the event. Each invention is marked with a unique ID at the top right of the page. Use this ID to look up and book a meeting with the inventor(s) at the Danish IP Fair website - www.dipfair.dk.

The document will be updated regularly in the period February-April, so ensure to re-visit the website for the newest version.

For further guidelines regarding meeting bookings please consult the menu Matchmaking on the website.

Device and method for detecting and imaging conductive objects

Induction of eddy currents

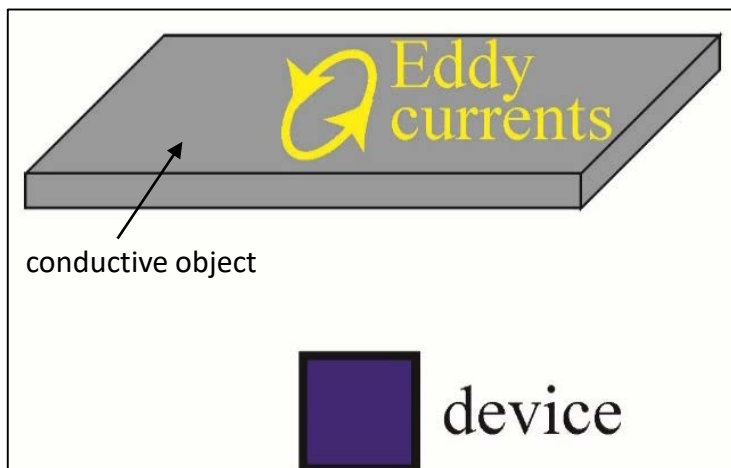


Figure 1: Induction of eddy currents in a conductive object such as metal or biological material.

Detection of eddy currents

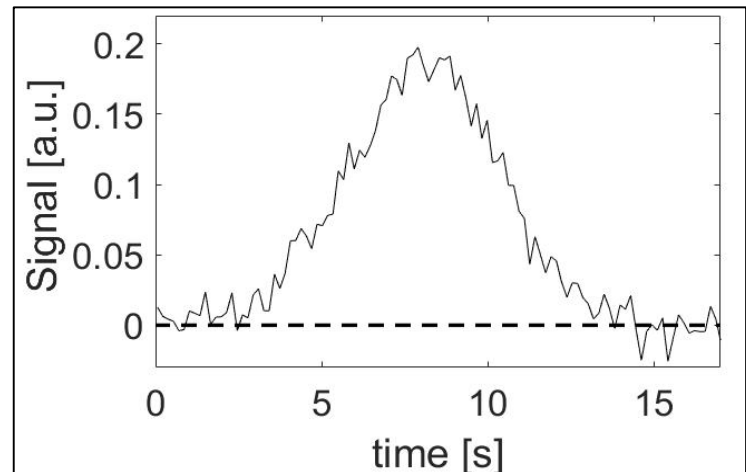


Figure 2: Proof-of-principle detection of eddy currents in salt-water (as a proxy for biological material).

Value Proposition

- Our device can detect and image electrically conductive objects.
- The method is non-destructive. The device is placed at a distance from the object to be imaged.
- Key features: improved signal-to-noise ratio and high sensitivity => fast detection of high and low conductivity objects.

Commercial Perspectives

Detection, imaging and characterisation of conductive objects is of interest for

- industry, for detecting cracks or defects in surfaces of metals or other high-conductivity materials
- geophysics, for underground exploration and localisation of hidden objects
- bio-medical devices, for imaging biological tissue (including the heart), potentially a tool for medical diagnostics.

Technology Summary

The device works by inducing and detecting eddy currents in the conductive object to be imaged. Our invention gives high sensitivity, which leads to fast detection/imaging of high conductivity objects (such as metals) and makes it possible to detect low conductivity objects (such as biological tissue).

Current State

Laboratory proof-of-principle demonstration of the ability of the device and method to detect metals (copper, aluminum, titanium) and low-conductivity objects (salt-water).

The inventors (from the Niels Bohr Institute)

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Seeking

- Licensee
- Partner/Research Collaboration

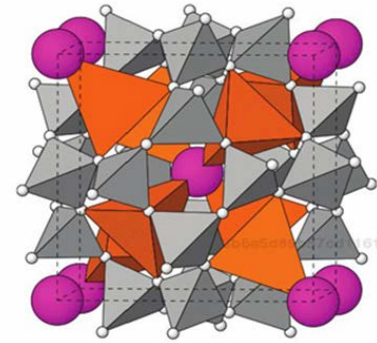
A patent application is in draft



Photoactive Pigments:

Luminescent and photochromic inorganic pigments made from cheap, non-toxic and abundant raw materials

Sodalite, $\text{Na}_8[\text{Al}_6\text{Si}_6\text{O}_{24}]\text{Cl}_2$, is the parent compound for a range of photoactive materials. Its crystal structure is shown on the right, where the Cl^- sites are shown in magenta.



- In ultramarine, these Cl^- ions are replaced by S_3^- radical ions resulting in a deep blue colouration.
- When some of the Cl^- ions are replaced with S^{2-} ions, the material becomes photochromic under 254 nm UV irradiation; changing from colourless to magenta, cf. the mineral hackmanite.
- When this material is partially oxidised it displays a strong yellow-orange luminescence under 365 nm UV irradiation.
- We have invented a new material by manipulating the chemistry of a sodalite-type substance that displays persistent white luminescence when excited by 254 nm UV irradiation.
- We have also invented a closely related material that displays a strong white luminescence when exposed to UVC irradiation.

USP

We have developed a method for producing a persistent luminescent **non-toxic** material based on aluminosilicate chemistry with a broad band emission (white light) that **does not contain or require any transition, lanthanide (rare-earth) or actinide element**.

Commercial / Collaboration Perspectives

Additive to plastic granulate – for large scale applications.

Additive to paint – for large scale applications

Other applications include:

Anti-counterfeit

Inspection after/during UVC sterilization

Information and warning signs



The current development stage of the method opens for different possible collaboration setups:

Collaborative development (including licensing) of the method and product towards a product fitting your product portfolio.

Industrial PhD or Industrial Postdoc targeting mutual interests towards a deeper insight into the produced material – this is also an opening for an optimized method and/or material.

We have produced samples in collaboration with Controlled Polymers A/S that show the effects when used as an additive to plastic.

Technology Description

The method is reproducible and we can control the different features of the final product.

The material is similar to the well known synthetic Ultramarine pigment (<https://en.wikipedia.org/wiki/Ultramarine>).

The stability, size, structure, costs and applications are comparable to Ultramarine

Development Phase/Current State

As we have shown – the method is reproducible and these materials work as an additive to plastic granulate. This technology can be optimized and applied to products straight away – for immediate use.

In the longer term we plan to control the chemistry of these materials so that they can be activated by long wavelength UV that will create many more business opportunities. And also produce related photochromic materials with other colours.

The inventor

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Seeking

• Funding/Investors

• Licensee

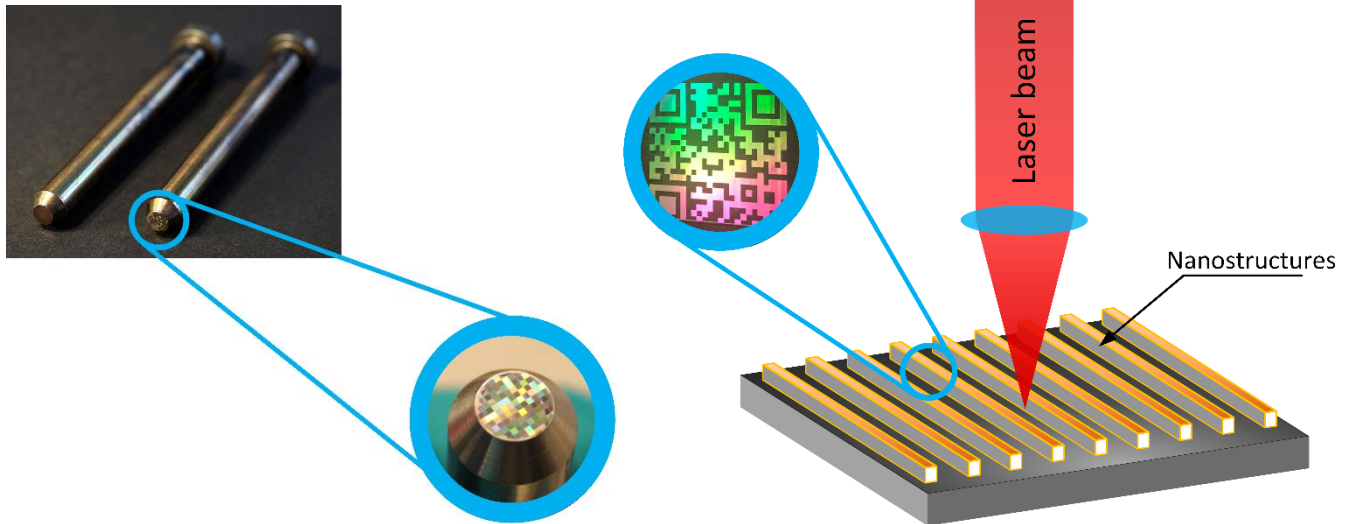
• Partner/Research Collaboration

• IPR Sale

Intellectual property rights: Patent pending, EP-17199703.4, 2/11-2017

Nanopattern and Protect

your product as easy as a postal stamp or point a laser



Value Proposition/USP

Nanotechnology can be applied to create highly sophisticated custom-made stamps, which could be used on hard surfaces such as metal and plastic with decorative or functional purposes.

Case 1: Nanostamping tool is a unique easy to use nanopattern transfer device dedicated for encrypted and design pattern transfer on solid surfaces. This technology competes with conventional stamping tools that create simple patterns and holographic technology. However, both competing solutions either suffer from easy to reproduce options to highly expensive and limited access. In contrast, we offer a tool that could be fully customized, has an affordable price (stamps per items) and guarantee unique protection or design to your product.

Case 2: Direct laser patterning micro- and nanopatterning technology allows to creating a visual pattern on different surfaces with encoded customized designs with high resolution on a variety of surfaces and shapes, including metal, stones with odd shapes or on a flat surface with the minimum size of a dot of below 1 micrometer. The advantage of this technology is fast transfer of patterns on desired surfaces, but the disadvantage is a large amount of investments into a laser system. For that reason we provide an easy to access nanostamping tool, that does not require large initial investments and can be customized and premade according to your needs.

Both solutions were specifically designed for jewelry market. We tested both technologies on most of soft metals, meaning a possibility to apply this tool on many products with possibility to protect it and add unique design and value for your business.

Business Opportunity/Objective/Commercial Perspectives

Both technologies can be used in all industries where products need authenticity or certification protection, physical data protection and as a bonus unique pattern design. Potentially, we consider jewelry and luxury product market, logistics, machine buildings, medical devices etc. Existing authenticity and brand protection technologies do not provide high level of protection, however our solution uses state of the art nanotechnology patterning and encrypting that guarantee impossible reproducibility by third parties.

Technology Description/Technology Summary

Both technologies have passed successfully prototyping stage and currently considered for customers tests and market access. Both technologies are state of the art developed at DTU with academic and industrial partners.

Development Phase/Current State

Both technologies are in the process of notification of inventions discussions with partners and DTU.

The inventors

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Seeking

- Funding/Investors
- Partner/Research Collaboration
- IPR Sale