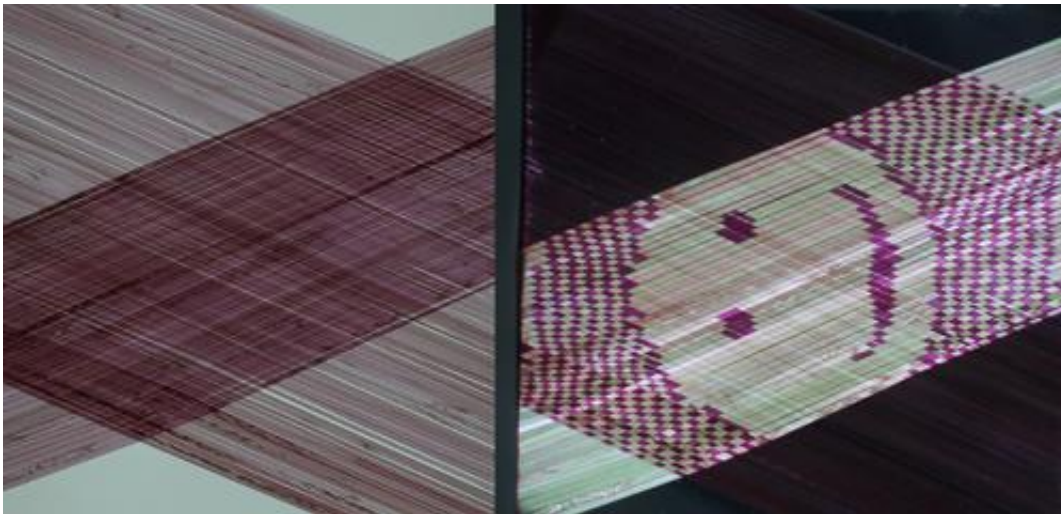


Invisible pattern can put a stop to counterfeit designer clothing

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Using invisible thread can help clothing manufacturers create a logotype that is part of the actual fabric and that only becomes visible under polarized light. The technology produces a specific optical spectrum that is very difficult for pirate manufacturers to copy. Credit: Christian Müller

There is now a way to differentiate between designer clothing and knockoffs. Chalmers researcher Christian Müller has produced a thread with unique optical properties, which can be used to create invisible patterns in fabrics that are only visible under polarized light.

According to Swedish Customs, trade in counterfeit and pirated goods has exploded the past few years in Sweden, the EU and globally. The

situation impacts companies, their employees and unknowing consumers. It is often difficult to see the difference between a genuine garment and a knockoff.

Christian Müller, researcher in [polymer technology](#) at Chalmers University of Technology, has found a solution to the problem. He has created a partially [invisible](#) thread made of [polyethylene](#) and a dye molecule that absorbs [visible light](#). The thread can be weaved into a pattern that is invisible to the naked eye, but which can be seen using a polarization filter.

"The production process itself uncomplicated," he says. "Clothing manufacturers could start using the thread right away to put a signature pattern in their [garments](#). The equipment needed to see the pattern is fairly simple, and is already in place at Swedish Customs, for example."

The invisible thread can be created using several different [dye molecules](#) and several different synthetic fibre textiles such as nylon. The dye molecule can also be bonded to natural fibres such as wool and silk. The technology can be used both for clothes and for different types of expensive speciality fabrics such as the textile used in vehicles and caravans.

The idea is for a brand to be associated with its own special combination of textile fibres and dye molecules. The thread is easy and inexpensive for a company to produce.

"It is very difficult for pirate manufacturers to copy the unique combination," says Christian Müller. "They can obtain the equipment needed to read the pattern and ascertain the optical spectrum produced by a specific signature, but they cannot know which combination of components will produce the specific spectrum. And there are loads of different dye molecules available for use."

He published his results last year in the *Applied Physics Letters* scientific journal. Prior to that, it was not known that a pattern can be created in textile that is part of the actual fabric, and that is only visible under polarized light. There is, however, a similar technology available for creating invisible patterns on banknotes, which is used in Switzerland, for example.

From a long term perspective, Christian Müller's discovery could also be used to manufacture "smart textiles", such as clothing that changes colours based on electrical charge.

More information:

apl.aip.org/resource/1/applab/v101/i17/p171907_s1

Provided by Chalmers University of Technology

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