Technical University of Denmark DTU

Layer thickness determination

- using far-infrared laser light at terahertz frequencies

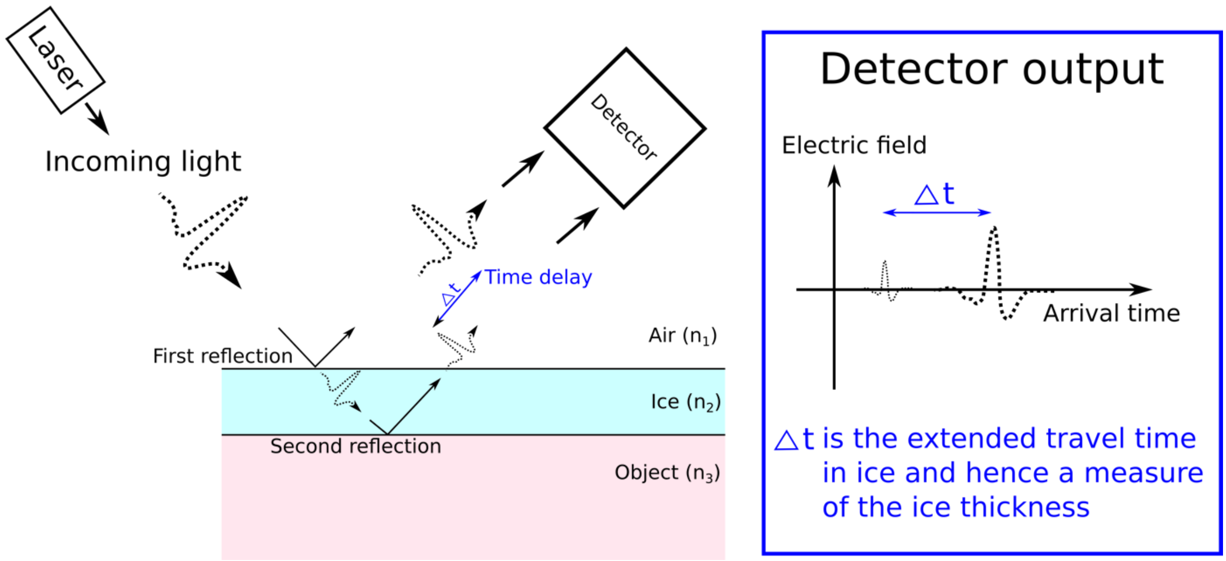

Figure | Schematic outline of the layer thickness determination. Measurements are direct, non-contact, non-destructive and real-time. Far-infrared frequencies allow for both few micrometer depth resolution as well as good penetration depth into samples.

Value Proposition

Laser based, far-infrared layer thickness determination is a novel tool, which allows for inspection of products and systems that could previously not be investigated in a non-destructive and/or non-contact way. This allows for real-time feedback and optimization of production lines and -systems. Moreover, its fundamental physical principle makes it suitable for a handheld device to be used in various environments where measurements have otherwise been impossible or unfeasible. It has unprecedented resolution of 1/100 of a mm, which makes it suitable for premium quality inspection.

Business Opportunity/Commercial Perspectives

The technology can be used to investigate both thin and thick, layered objects, and can be implemented in virtually any existing system. One particular use case is the determination of ice glaze layers on frozen fish products during production. This allows the production facility to keep an known, optimal glazing thickness in order to maximize quality and adjust the amount of sold, unfrozen food. The annual market cap for such technology is an estimated 1 billion US dollars.

Technology Description

As shown in the top figure, the technology relies on the ability of far-infrared radiation to be partly reflected from interfaces between many different non-conductive materials. A laser source provides an incoming signal, and a detector measures all reflections. A computer algorithm analyzes the results and estimate the thicknesses of all reflective layers in the object.

Development Phase/Current State

The technology has been prototyped and tested in a large-scale food production facility to measure ice glazing layer thickness on few samples. Next step is to conduct experiments on a large sample size in order to confirm the stability of the system. Moreover, development of a new prototype laser is expected to be finished within 3-4 months, effectively taking both price and size down by an order of magnitude.

The inventors

Simon Lehnskov Lange slla@fotonik.dtu.dk
Flemming Jessen fjes@food.dtu.dk

Contact Information

Danmarks Tekniske Universitet
Institut for Fotonik
+45 22 98 77 99
slla@fotonik.dtu.dk

Seeking

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