Diatoms as security particles for counterfeit protection: requirements and demands

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Introduction

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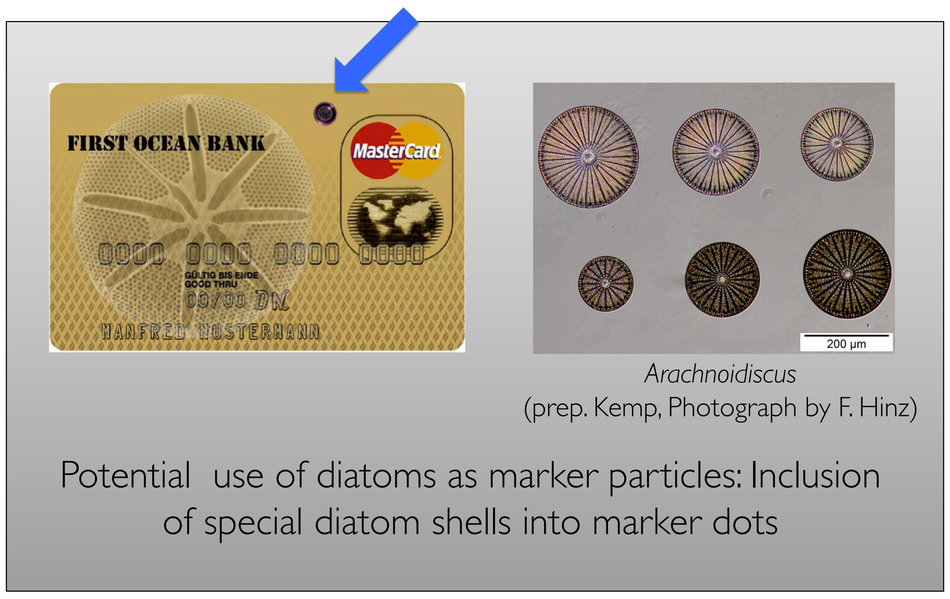
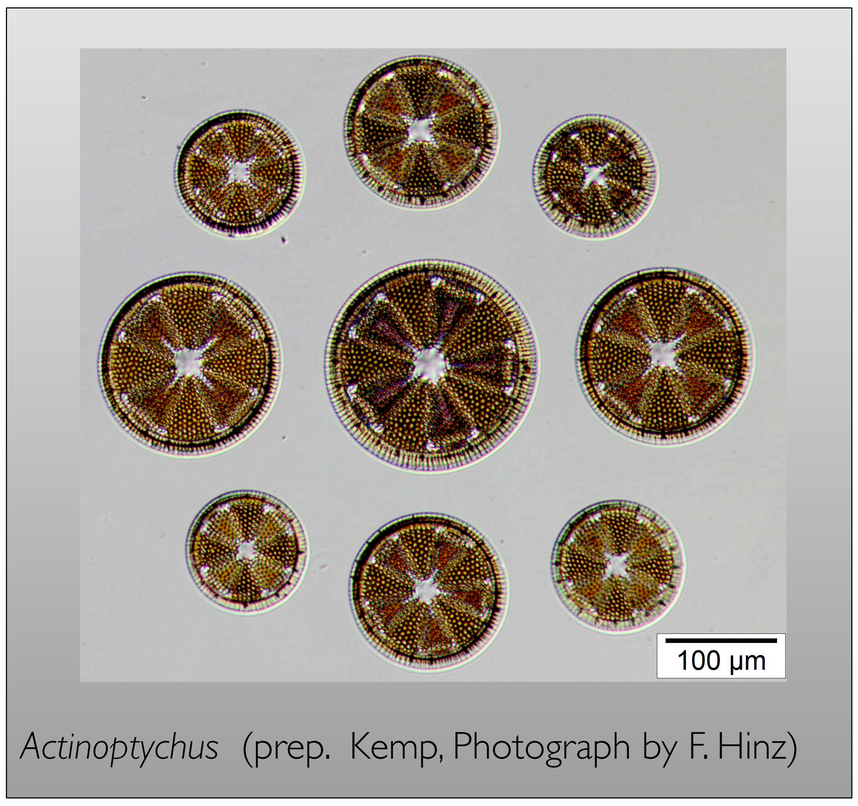
Counterfeiting of products such as paper money, documents, watches and mechanical spare parts causes considerable damage – not only financial losses for the patent holders and producers, but also a severe loss of safety arrangements in technical fields e.g. fire protection and automotive industry and its component suppliers.
Thus, protection against counterfeiting becomes more and more important.



Arachnoidiscus
(prep. Kemp, Photograph by F. Hinz)

Potential use of diatoms as marker particles: Inclusion of special diatom shells into marker dots

Why diatoms?



Actinoptychus (prep. Kemp, Photograph by F. Hinz)

The use of diatom shells as special markers

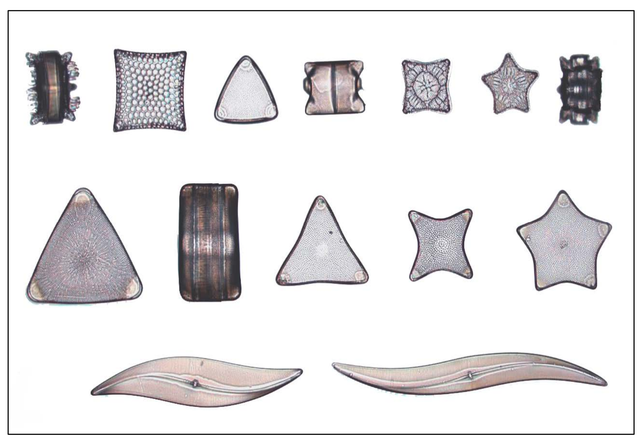
One possibility to ensure protection against forgery is to label the original products with special markers. In our study, we investigate and develop new, effective procedures to generate and use diatom shells as security particles. The following characteristics offer considerable advantages:

- Diatoms have very characteristic 3D-silica frustules.
- The silica is resilient against high temperatures and acids.
- Diatoms have a high species diversity.
- Significant modifications of the shell structure are possible.
- They can be combined with other security particles.

Goal

The aim of our study

- ✓ Select, sample and cultivate appropriate species (search continues)
- Modify frustules in an efficient, highly specific way that cannot be copied.
- Gain new insights in morphogenesis and its regulation.
- Develop ideal solutions to apply and verify specific diatoms on selected products.

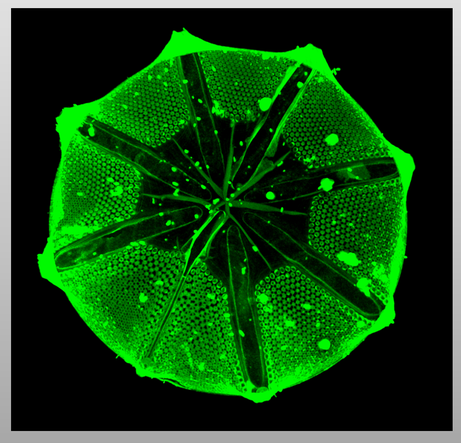


Next steps

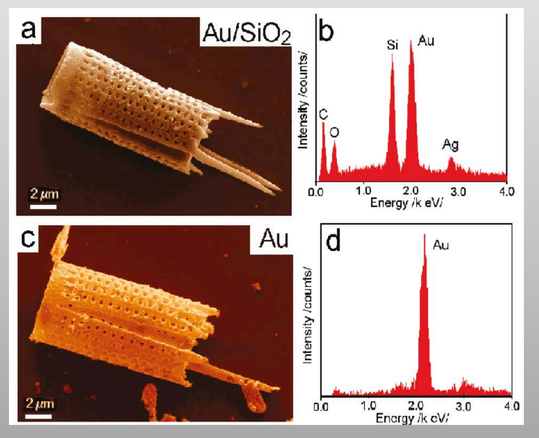
Current task:

Manipulate diatom shells

1. Fluorescent dyes, coating
2. Chemicals
3. Mutations (UV, others)



(Friedrichs *et al.* 2013)



(Yu *et al.* 2010)