UNIVERSITY OF GDANSK

TECHNOLOGY TRANSFER OFFICE

TECHNOLOGICAL OFFER
No. 028/1/2018

AUTOMATED DEVICE FOR SURFACE ENERGY MEASUREMENT OF SOLIDS PERMANENTLY SUBMERGED IN LIQUIDS

Market

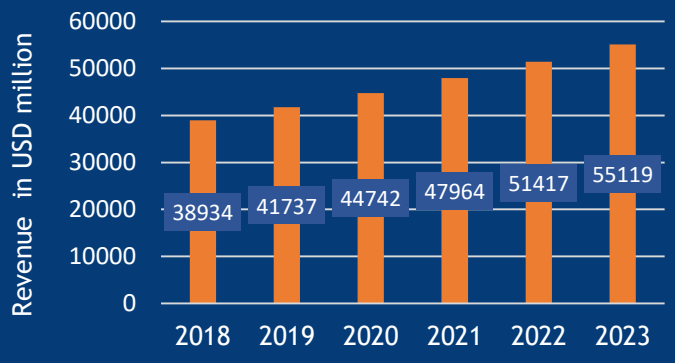
Products of the life sciences and laboratory equipment market are widely used in energy, polymer, mining/metallurgy, and food manufacturing sectors. They may be applied for identifying defects, analysing, predicting materials failure, detecting contaminants, biofouling growth, surface weathering state, and profiling the depth of materials. The contact angle measurement market is a target market for the proposed invention. It makes a part of addressable surface science market, being a segment of total life sciences and laboratory equipment market. It constitutes a small, niche, technologically advanced B2B market characterised by high competitiveness with a strong position of several companies and stable growth. According to Bioinformatics data base the value of the contact angle measurement market is expected to increase form USD 255 mln in 2018 to USD 356 mln in 2023.

Technology

Proposed device sets up for the measurement of dynamic contact angles (CA) by the captive bubble method, and is unique in its ability to measure the surface free energy (SFE) of a fully-hydrated solids submerged in liquid phase (not only aqueous) in situ, without any physical or chemical treatment of the test sample (such as transfer, removal or drying). The surface of investigated solid remains fully submerged and emersion is not required for contact angle measurements, as in case of all research protocols based on classical sessile drop methods, requiring usage of test fluids and proper surface preparation. Developed device effectively measures dynamic contact angles what allows to determine additional wettability parameters, such as CA hysteresis or Π that provide additional information (surface roughness and chemical homogeneity or surface deposition, respectively) on the structure of investigated surface.

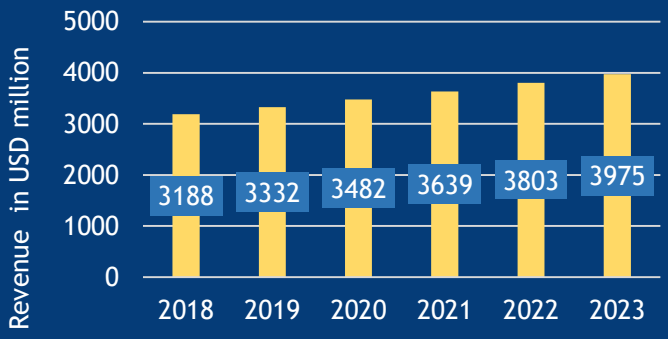
Opportunity Analysis and Forecasts to 2023

Life sciences and laboratory equipment market size and forecast for years 2018-2023



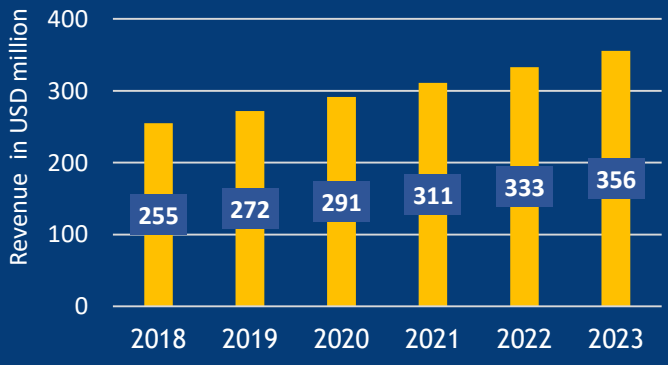
Source: BioInformatics, 2017

Surface science market Size and forecast for 2018-2023



Source: BioInformatics, 2017

Contact angle measurement market size and forecast for years 2018-2023



Source: BioInformatics, 2017

Fundusze Europejskie Inteligentny Rozwój

INKUBATOR INNOWACYJNOŚCI+

Ministerstwo Nauki i Szkolnictwa Wyższego

Unia Europejska Europejski Fundusz Rozwoju Regionalnego

UNIVERSITY OF GDANSK

TECHNOLOGY TRANSFER OFFICE

TECHNOLOGICAL OFFER
No. 028/1/2018

Technology highlights

1. Adsorption, wetting and liquid to solids surfaces adhesion play a key role in many industrial sectors such as polymer production, material coating and machine engineering.
2. The device has the following possible applications: prosthodontics, biofouling, research teams investigating anti-corrosion coatings, paints and electrochemical sensors, marine, hydro-engineering, agrochemical, limnologic laboratories and research institutes.
3. The device has been tested with abiotic (glass, plastic, metal and gel plates), and biotic (wood, macrophyte leaves, plants submerged in water), bottom ecosystems of natural water reservoirs contact surfaces (lake, sea) substrata. A prototype, computer-driven version of the apparatus for practical use is available.

Authors

Prof. Stanisław Pogorzelski
Maciej Grzegorczyk

Faculty of Mathematics, Physics and Informatics
University of Gdańsk

Commercialization opportunities

- Licensing relationship
- Transfer of ownership

IP Status

The invention was submitted for patenting according to Polish P.419913 procedures.

Implementation progress

TRL 6

Demonstration of the prototype in close to real conditions

Summary

Proposed device sets up for measurement of dynamic contact angles (CA) by the captive bubble method which is unique in its ability to measure the surface free energy (SFE) of a fully-hydrated solid submerged in a liquid phase (not only aqueous) *in situ*, without any physical or chemical treatment of the test sample (such as transfer, removal or drying). The surface of investigated solid remains fully submerged and emersion is not required for contact angle measurements, as in case of all research protocols based on classical sessile drop methods, requiring using test fluids and particular surface preparation. Developed device effectively measures dynamic contact angles what allows to determine additional wettability parameters, such as CA hysteresis or Π that provides additional information on the structure of investigated surface (roughness, spatial heterogeneity and surface material accumulation). Device can be widely used *inter alia* in: prosthodontics, biofouling studies, research teams investigating anti-corrosion coatings, paints, laboratories and research institutes of electrochemical, marine, hydro-engineering, agrochemical, limnologic profile and laboratories dealing with the subject of interfacial phenomena on the surface of solids.

Technology Transfer Office

office@tto.ug.edu.pl

+48 58 523 33 74
+48 58 523 33 75

ul. Jana Bażynskiego 1a
80-309 Gdańsk, Poland

Fundusze Europejskie Inteligentny Rozwój

INKUBATOR INNOWACYJNOŚCI+

Ministerstwo Nauki i Szkolnictwa Wyższego

Unia Europejska Europejski Fundusz Rozwoju Regionalnego