ARSOlux – Arsenic Biosensor based on Bioreporter Bacteria

Andreas Kölsch, September 5th 2012

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How Does it Work?

Take water sample

Incubate 2 hours

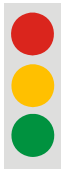
Measure 10 seconds

Read the result:

As: 8.19 µg/l

Light signal: red, yellow, green

Drinkable: Yes/No



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Field Testing

Saxony - Germany

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Bio Sensing of CO_2

www.wvminesafety.org

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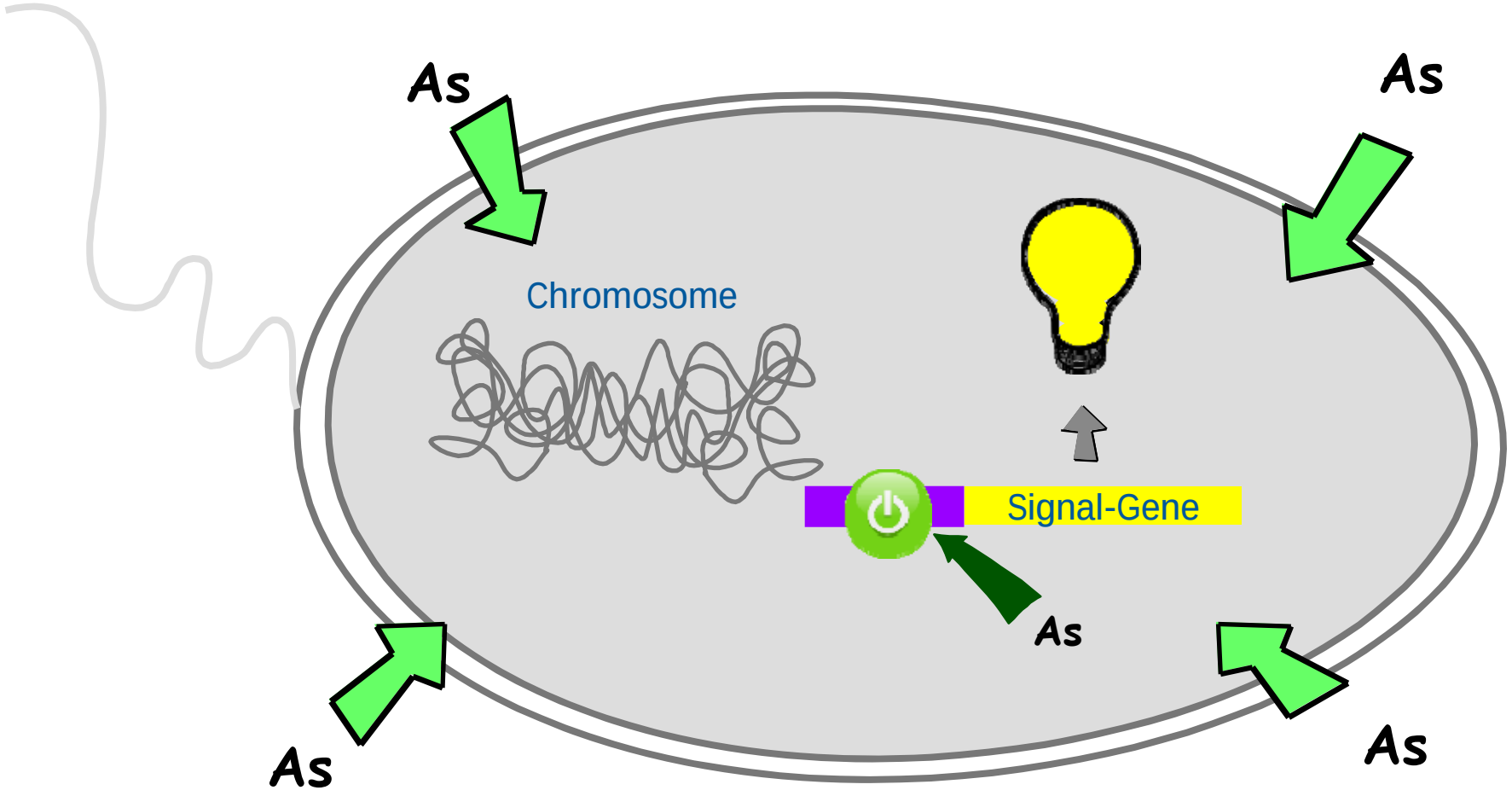
Bio Sensing of Arsenic



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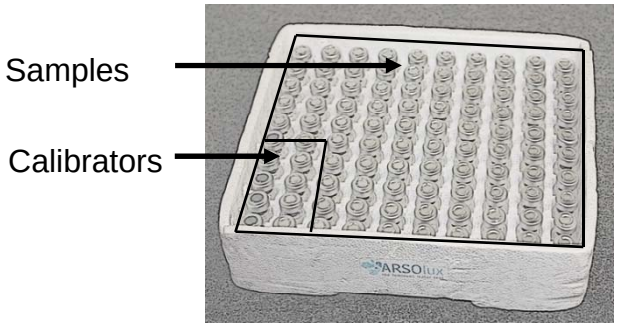
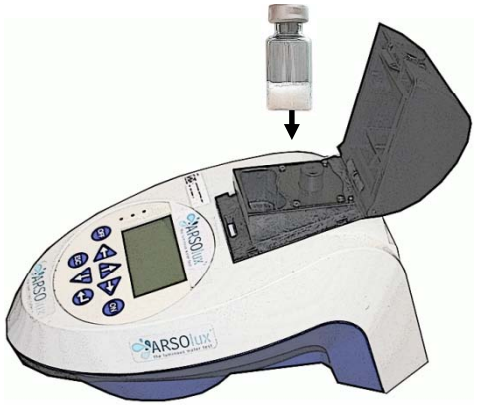
Manual

Calibration
(Measurement of four arsenic standards)



Filling of calibrators & samples into the biosensor vial
(mix biosensor and sample,
two vials per sample: one undiluted, one diluted)



Measurement of the light emission with a luminometer
(light emission corresponds to arsenic concentration)

Read and store data
(calculation of arsenic concentration in samples based on calibration data)

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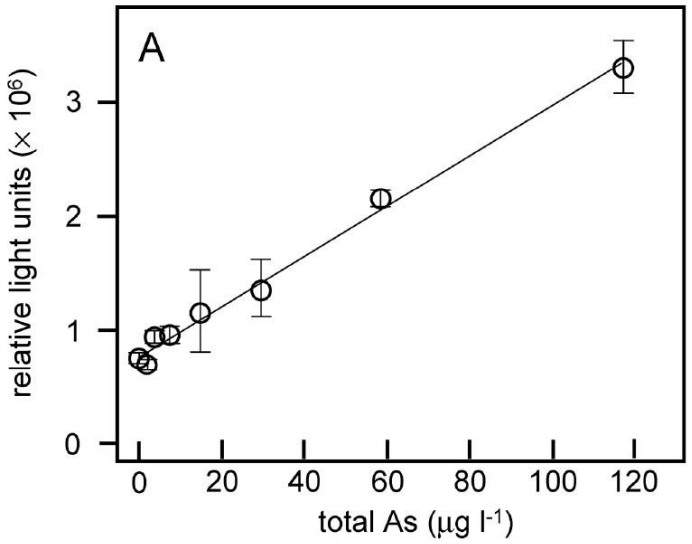
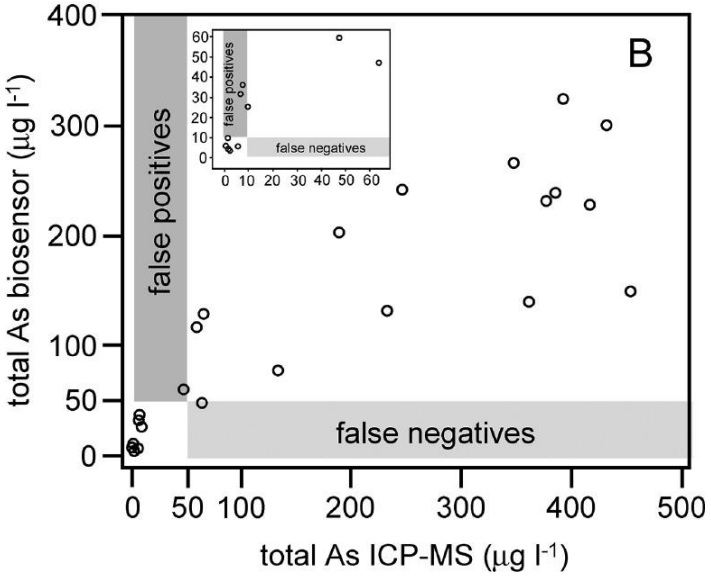
Accuracy





- ✓ ARSOlux calibration (field)
- ✓ Cross analysis ARSOlux (with EDTA) versus ICP-MS
- ✓ Toxic inhibition >150 µg As l^{-1}

Siegfried et al., 2012

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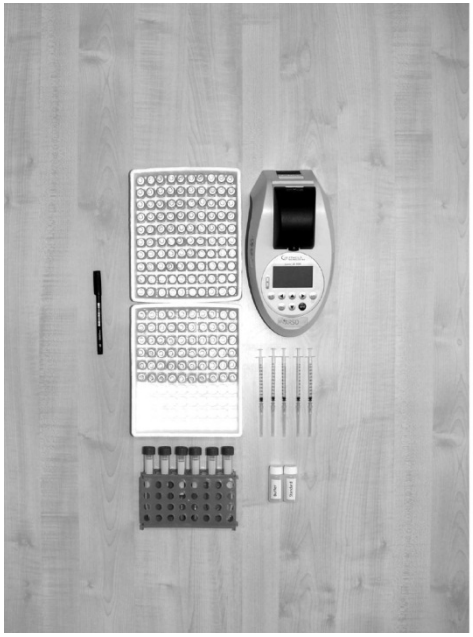
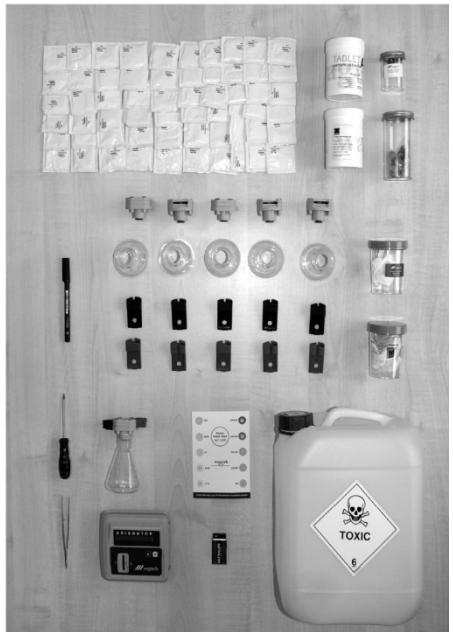
Biological vs. Conventional

Material for 160 tests

ARSOlux



Chemical test



Siegfried et al., 2012

Advantages of ARSOlux:

- ✓ Parallel measurements
- ✓ No toxic chemicals
- ✓ Less material needed

Challenges of ARSOlux:

- ✓ Interference of Iron
- ✓ GMO
- ✓ Acceptance

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Patent and Registered Trademark

BUNDESREPUBLIK DEUTSCHLAND

URKUNDE

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ARSOlux

Markeninhaber/in:
Helmholtz-Zentrum für Umweltforschung GmbH - UFZ, 04318 Leipzig, DE

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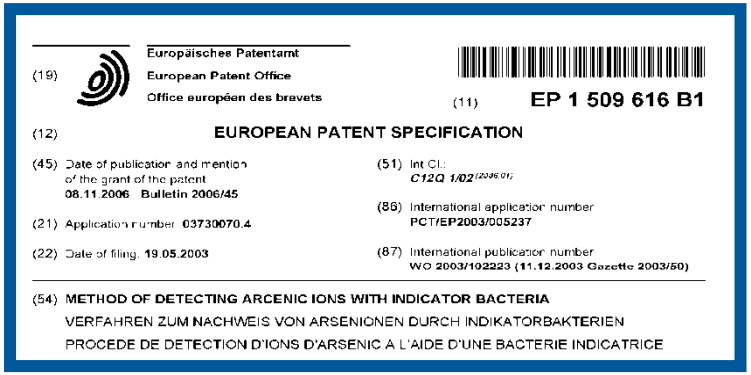
Der Präsident des Deutschen Patent- und Markenamts

Dr. Schade



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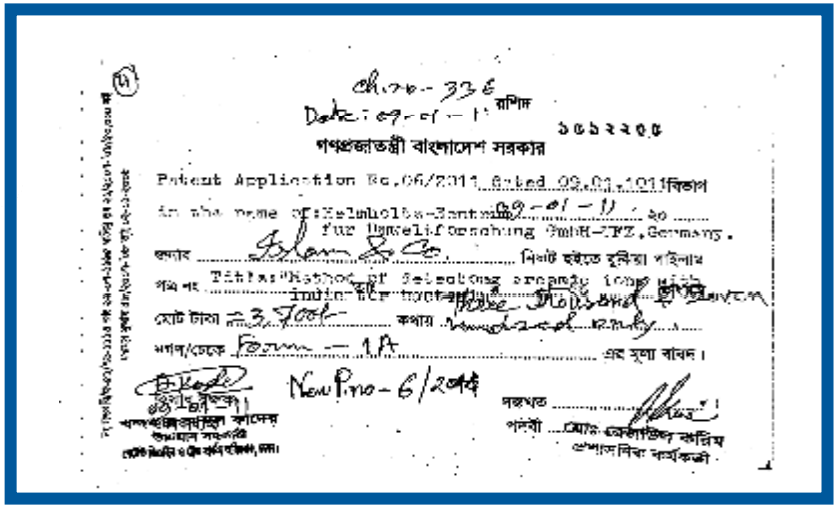
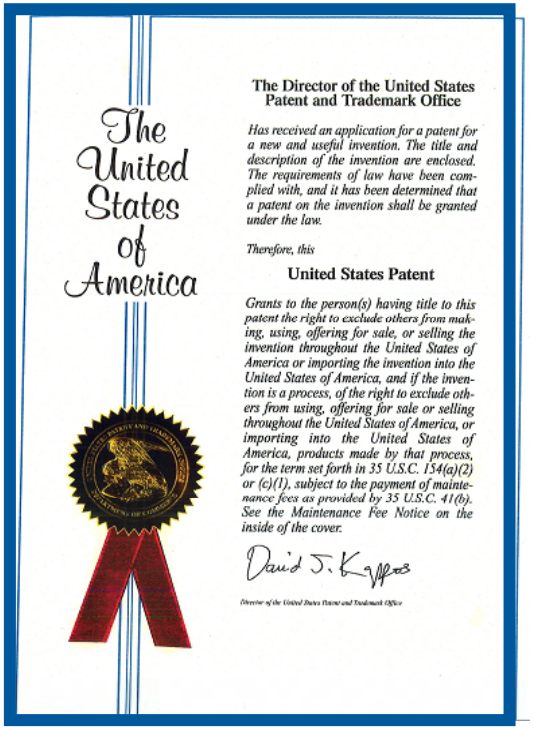
(54) METHOD OF DETECTING ARCENIC IONS WITH INDICATOR BACTERIA
VERFAHREN ZUM NACHWEIS VON ARSENIONEN DURCH INDIKATORBAKTERIEN
PROCEDE DE DETECTION D'IONS D'ARSENIC A L'AIDE D'UNE BACTERIE INDICATRICE



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

Patent Application No.06/2011 dated 09.01.2011

in the name of: Helmholtz-Zentrum für Umweltforschung GmbH-UFZ, Germany.



The United States of America

The Director of the United States Patent and Trademark Office

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, or importing into the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.

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Thank you for your Attention

ARSOlux
the luminous water test

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