



pharmelp

UNIVERSITÉ DE GENÈVE

HUG Hôpitaux Universitaires Genève

Hes-so Haute école spécialisée de Suisse occidentale Fachhochschule Südwestschweiz

Haute école d'ingénierie et d'architecture Fribourg
Hochschule für Technik und Architektur Freiburg

Open source capillary electrophoresis device for quality control of medicines

Olivier Vorlet, Samuel Roth, Claude Rohrbasser, Serge Rudaz, Pascal Bonnabry

HES-SO | HEIA-FR | ccCTA 2019 – Les Diablerets

Substandard and falsified medical products

Fake drugs

10% in the world
> 30% in Africa
> 90% on Internet
< 1% in the developed country



Low cost device for quality control

GPHF-MiniLab

Lab kit for 90 APIs
Pass/fail screening
About 3500 \$



Lack of simple and inexpensive
device for quality control

Without active ingredient	32%
Incorrect dosage	20%
Bad ingredients	21%
High impurities	9%
Falsification of packaging	17%
Copy of original product	1%

> 80 % Substandard
Public health problem

< 20 % Counterfeit
Intellectual-property problem

Counterfeit Detection Device CD3+

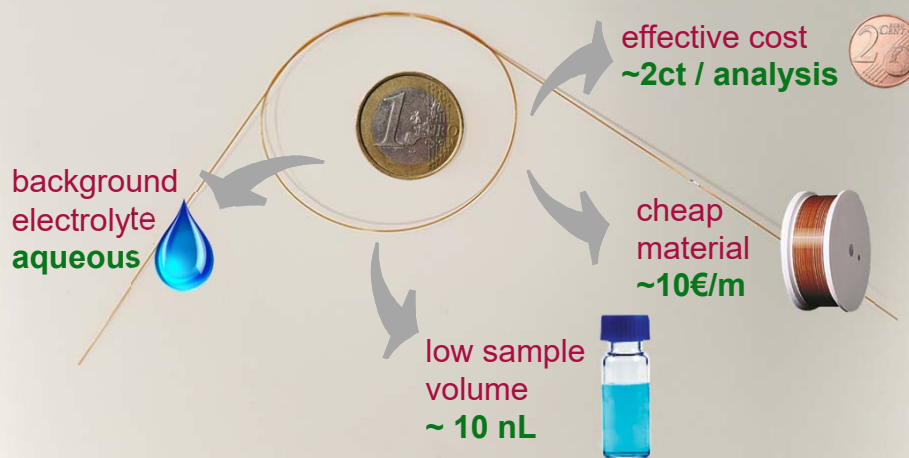
Camera system with various
LED sources
About 1000 \$



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Why Capillary Electrophoresis (CE) ?

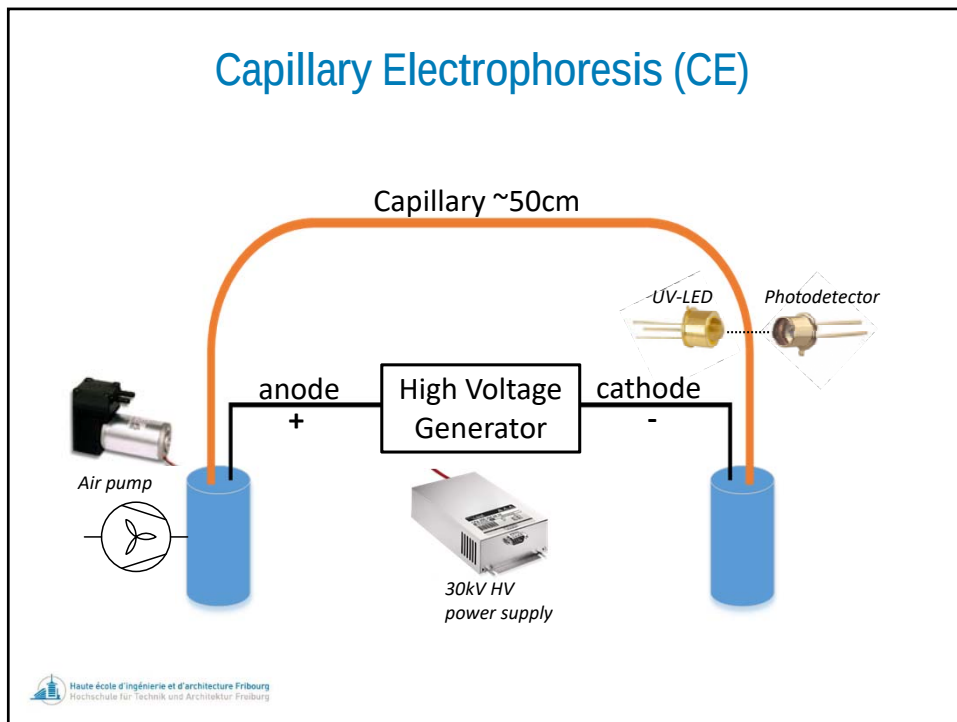
appropriate technologies for emerging countries



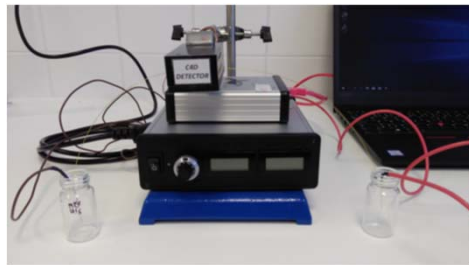
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Capillary Electrophoresis (CE)



Homemade Capillary Electrophoresis Projects



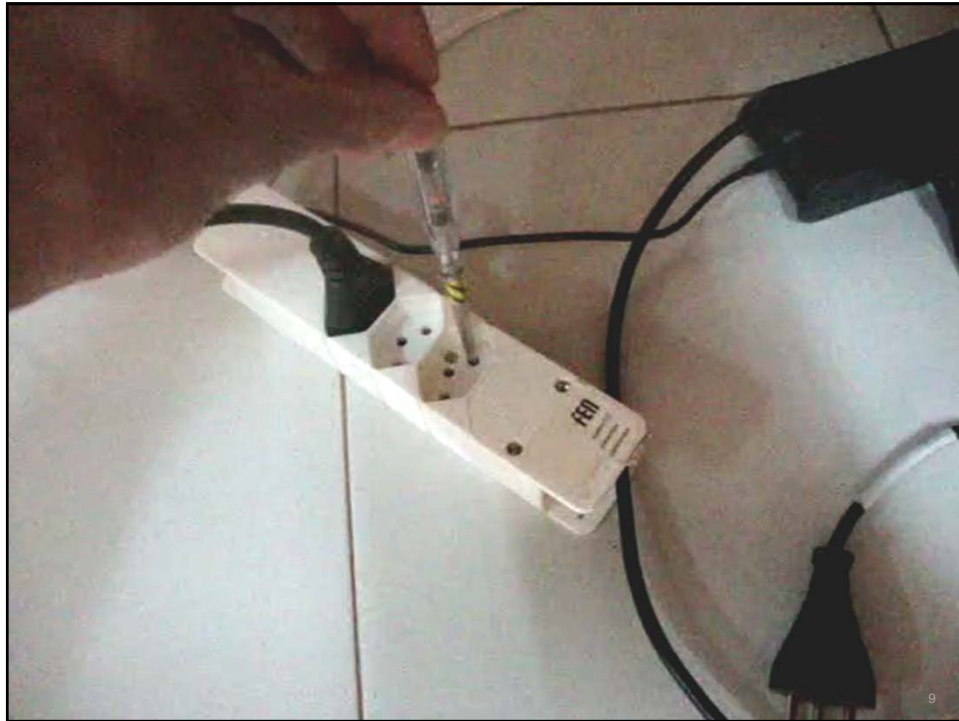
Gordana O, 2016



Hong Anh Duong a, Thanh Dam Nguyen a, Thanh Duc Mai a, Jorge Sáiz b, Hung Viet Pham , 2016

2005 – 2009 Development of a low cost CE device







Support the quality control in emerging countries

pharmelp

Pharmelp is an association with non-lucrative purpose created to support the quality control and the screening of counterfeit medicines in emerging countries.

- Our goals**
- Search for funds in order to finance CE devices
 - Theoretical and practical training of laboratory staff
 - Contribution of a scientific and technical support



Needs for a new device

Appropriate technology

- Adapted to environmental conditions
- Simplified maintenance
- Energy Autonomy

Sustainable Development

- Ecology of components
- Energy consumption
- Cost of production

Durability

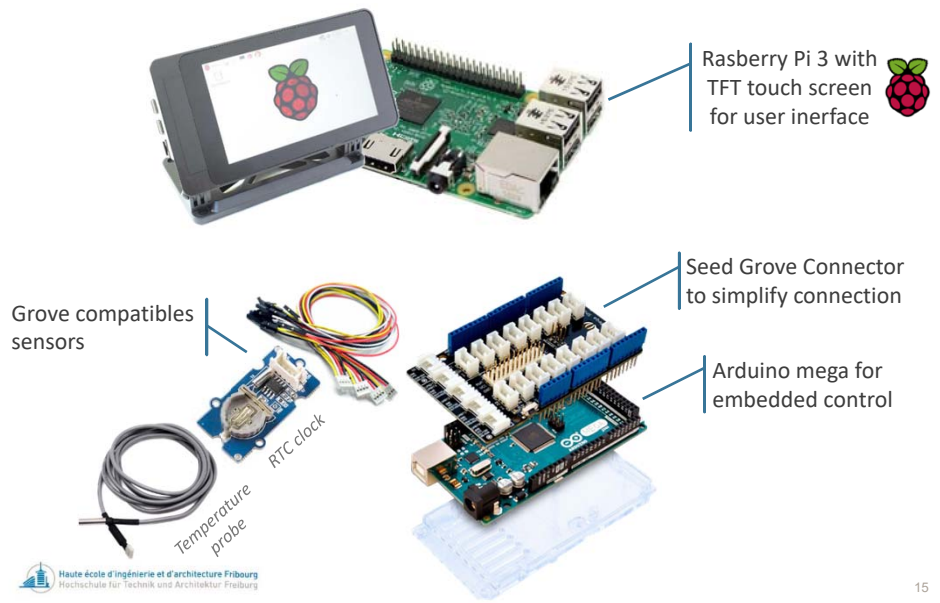
- Open Source
- Open Hardware
- Components Interoperability

Flexibility

- Evolutive system
- Modular components



Open Source Components



3D Printing – Ideal for complex shapes



Laser cutting – Ideal for small production



Enclosure and sample holder are cut in Plexiglas (PMMA) 4 - 8 mm thick



Easy to build with aluminium profile



The components are ordered online and delivered cut-to-size.
You only need a screwdriver

Power supply : Flexibility and autonomy

By solar panel with
battery storage
3h autonomy



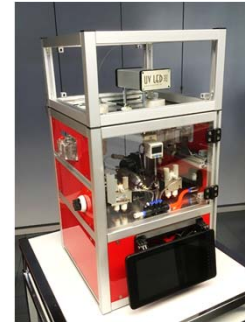
From standard
power grid
230V / 115V
50Hz / 60 Hz



From all other 12V
power supply
p.ex car battery



12V standardization



Input 12 VDC
Maximum 80W

OpenCE

40 manufacturers
15 suppliers
120 articles
600 composants

Material cost
→ About 4'000 €

Assembly time
→ About 2 days



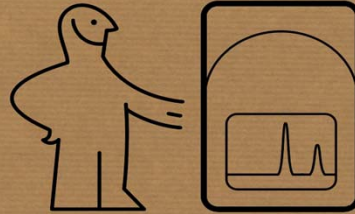
and...



Next step ...

ELËCTRÖ KIT

Make your own CE



Incl.



30 kV

1x



LED-UV

1x



Universal

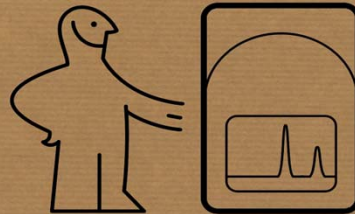
1x

IKEA

Next step ...

ELËCTRÖ KIT

Make your own CE



April 5-8, 2020
Saint-Malo, France

36th International Symposium on Microscale Separations and Bioanalysis

Merci



Baptiste Overney
Conception mécanique
Impression 3D



Vincent Nidegger
Développement logiciel
Electronique



Philippe Regnier
Responsable ETA
Valorisation



Michel Audriaz
Conception mécanique



Damien Goetschi
Interface utilisateur



Rolland Scherwey
Autonomie énergétique



Eric Clément
Conception électrique



Benoît Losey
Electronique détecteur



Sandy Ingram
Ergonomie interface



Damien Waeber
Découpe Laser



Andéol Demierre
Système solaire



Olivier Vorlet
Chef de projet

Thank you



Prof Olivier Vorlet
OpenCE Team leader



Prof Claude Rohrbasser
Pharmelp chairman



Prof Serge Rudaz
Geneva-Lausanne School of
Pharmacy (EPGL)



Ing Samuel Roth
Head of the analysis service



Prof Pascal Bonnabry
Head of pharmacy

