



The Quantum Grätzel Clock

**Developed by students of the Math and
Physics department of Gymnasium Köniz-
Lerbermatt**

Presented by Samuel Kaufmann and Tim Arni



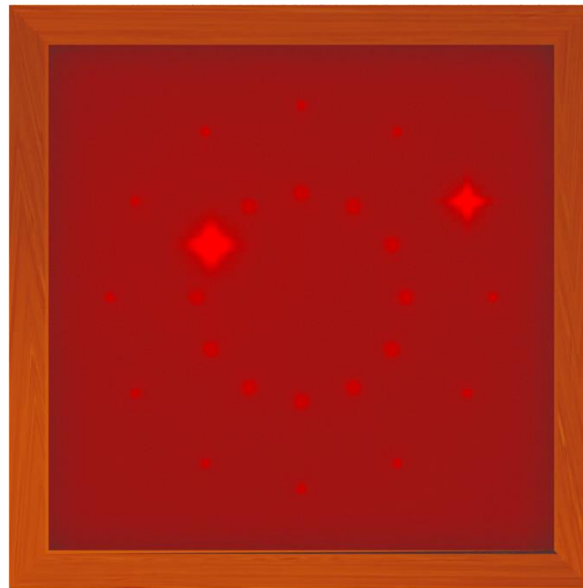
Quantum Spin-Off project is funded by the European Commission. This communication reflects the views of the author, and the Commission cannot be held responsible for any use which may be made of the information contained herein.



Idea



- Self-sustaining clock using *Grätzel* cells
- Digital, analogue or LED?
- We created an analogue clock which is controlled by an *Arduino Lillypad* chip



Technical difficulties



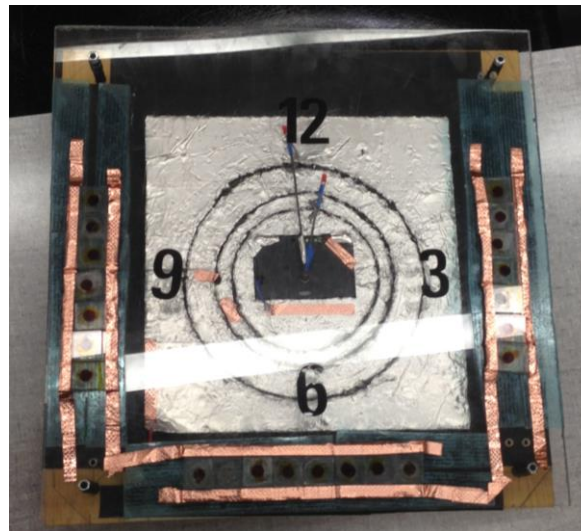
- Number of the Lillypad pins
- The soldering of the LED wires
- Transparency of the cells
- Amperage
- Wiring
- Night mode



Realization



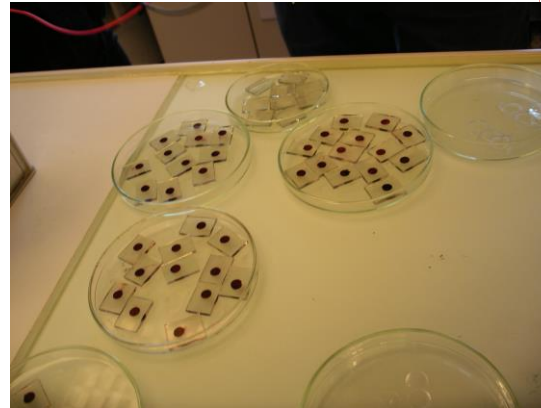
- Pre-assembled Swiss quality clock unit
- Clock hands improved with LED
- Nighttime power management
- Lithium accumulator



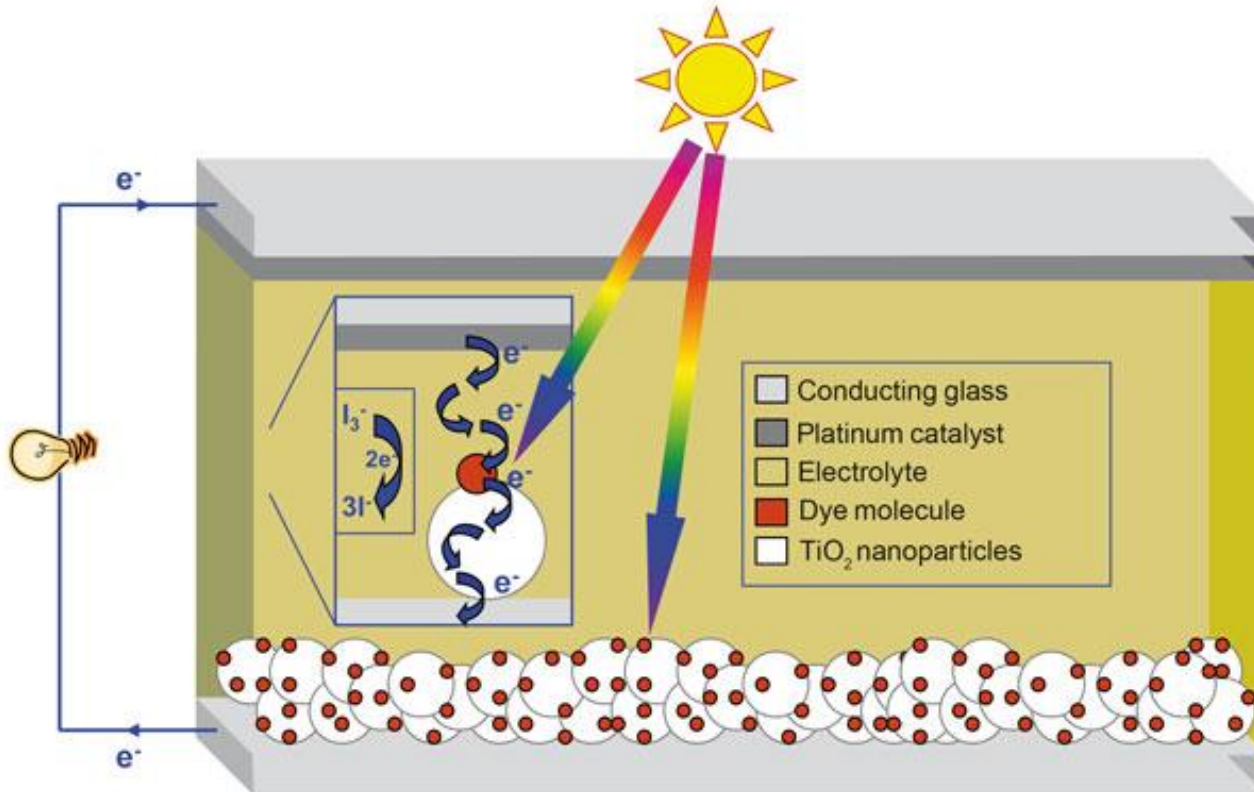
Manufacturing



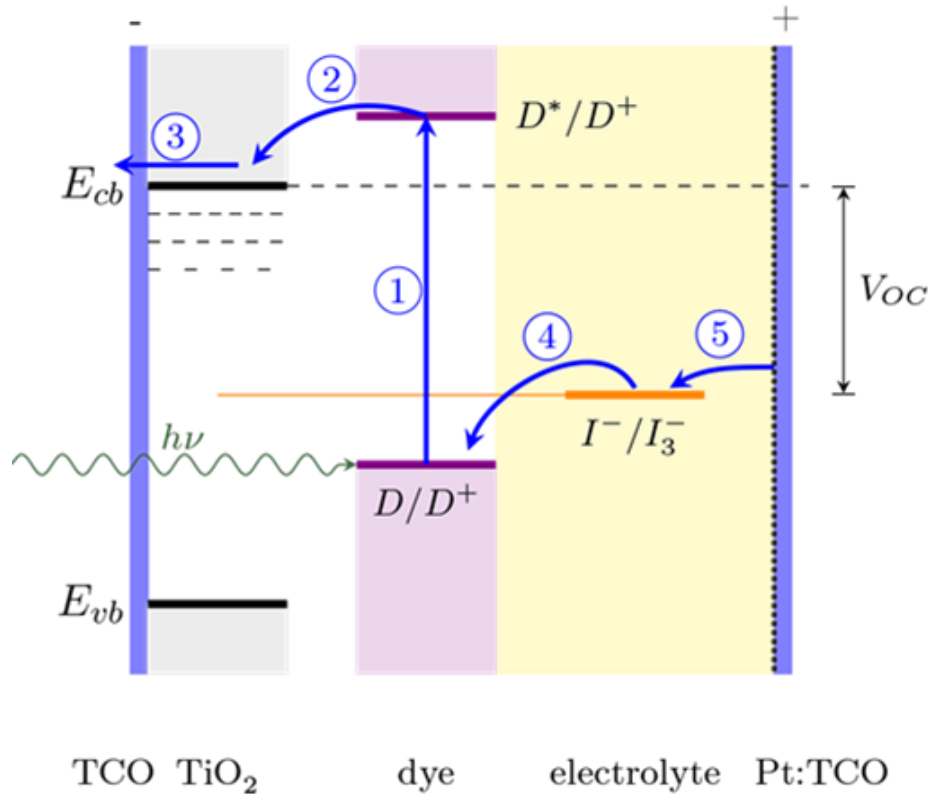
- Cutting and cleaning of the Fluorine doped Tin Oxide Glass
- Electrode:
 - Titaniumdioxide layer
 - *Sintering*
 - Dying (Ruthenizer)
- Counter electrode:
 - Platinum layer
- Assembling & filling with electrolyte
- Sealing



Grätzel theory



Grätzel theory



3. Electron transport
1. Excitation of sensitizer
4. Dye regeneration by iodide
2. Injection into TiO₂ (conduction band)
5. Electrolyte regeneration

Business plan



- Ecological and easy-to-handle clock based on future technologies
- Target price 30€
- Resources provider (Solaronix), scientific partner (Uni Basel)

QGC Quantum
Grätzel
Clock

Conclusion



- Informative Project
- Learned how to organize an enterprise
- Check feasibility and be well informed before starting
- Have different possibilities
- Organized in groups
- Team leader to supervise

CONCLUSION