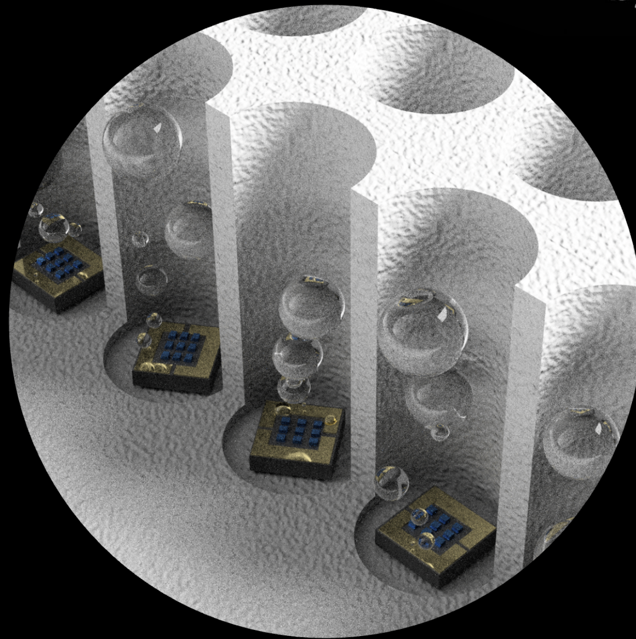
SPECS
by OWiC TECHNOLOGIES

SMALL PHOTOELECTRONIC ELECTRO-CHEMICAL SYNTHESIZERS



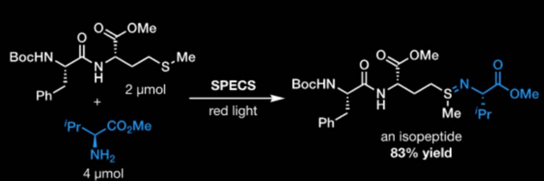
SPECS™ are *the* way to do electrochemistry at scale. No more wires and racks of electronics. All you need is light. You can run hundreds of reactions in parallel, dramatically speeding up electrosynthesis for drug discovery.

"…A LANDMARK ACCOMPLISHMENT IN THE FIELD OF SYNTHETIC ORGANIC ELECTROCHEMISTRY."
Phil Baran, Scripps (C&EN News, 2025)

"…AN ADVANCE THAT IS SET TO REVOLUTIONIZE THE DISCOVERY AND DEVELOPMENT OF ORGANIC ELECTROCHEMICAL REACTIONS."
Thomas O'Brien & Alastair Lennox
*Nature News and Views (**637**, 277 (2025))*

NOVEL MOLECULE DISCOVERY

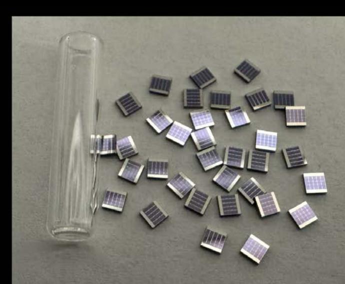
Electrosynthesis can create unique compounds with the potential to address a myriad of medical conditions. **SPECS bring the power of electrosynthesis to high-throughput drug discovery for the first time,** accelerating the discovery timeline.



SEAMLESS INTEGRATION

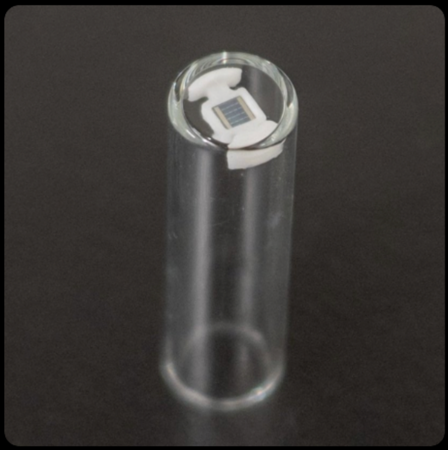
SPECS are tiny electrochemical devices powered by light. They turn a standard well plate into an electrosynthesis laboratory. **SPECS make electrochemical synthesis:**

- **as easy as photochemistry**
- **highly parallelizable**
- **fit seamlessly into HTE protocols**



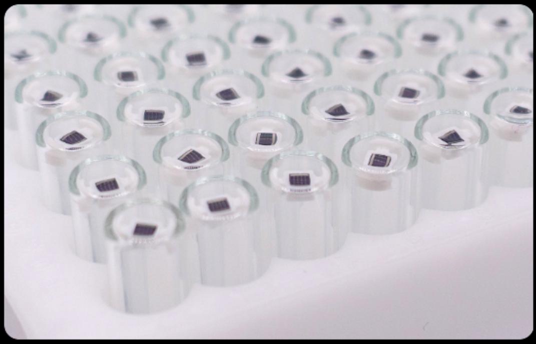
OWiC TECHNOLOGIES

SPECS™ FOR 1ML INSERTS



SPECS - 1mL are tiny electrochemical synthesizers installed directly in 1 mL (8 mm x 30 mm) glass inserts. When used with the Lumidox® 96-well reactor and LED array, production rates > 3 umol/hr/insert are possible.

Each SPEC is held in place with a press-fit holder (patent pending) to center it, suspend it above the bottom surface of the insert, and protect it from stir bars. The holder is made from chemically resistant polypropylene with no adhesives.



SPECS are delivered in 96 insert racks for easy loading into the Lumidox reactor. Loading takes literally 5 seconds.

- **SPECS size**: 2 mm x 2 mm x 0.5 mm
- **Electrodes:** Platinum
- **Holder:** 3D-printed polypropylene
- **Current:** 20 uA per sun of illumination
  (1 sun = 1 mW/sq mm)
- **Maximum output voltage:** 8 V
- **Mixing:** Compatible with stir bars, orbital shakers, etc.
- **Usage:** Intended for single use for maximum reliability.

SPECS™ FOR 4ML VIALS

SPECS - 4mL are tiny electrochemical synthesizers installed directly in 4 mL glass vials (14 mm x 45 mm, 1 dram). When used with the Lumidox® 24-well reactor and LED array, production rates > 10 umol/hr/insert are possible.

SPECS are held in place with a press-fit holder (patent pending) to center them, suspend them above the bottom surface of the vial, and protect them from stir bars. The holder is made from chemically resistant polypropylene with no adhesives.

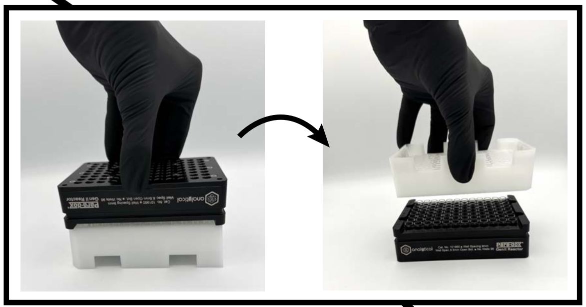
SPECS are delivered in 24 insert racks for easy loading into the Lumidox reactor. Loading takes literally 5 seconds.

- **Size**: Four 2 mm x 2 mm x 0.5 mm SPECS
- **Electrodes:** Platinum
- **Holder:** 3D-printed polypropylene
- **Current:** 100 uA per sun of illumination

  (1 sun = 1 mW/sq mm)
- **Maximum output voltage:** 8 V
- **Mixing:** Compatible with stir bars, orbital shakers, etc.
- **Usage:** Intended for single use for maximum reliability.

INSTRUCTIONS

OWiC SPECS for 1 ML inserts can be used in the Lumidox® 96-well reactor and LED array as shown below.



Load OWiC SPECS for 1 ML inserts into the reactor block either manually or by flipping all 96 into the reactor as shown.

Fill the inserts with your desired solutions.

Seal the inserts with the reactor block lid and place on top on the illuminator for bottom-side illumination.

OWiC SPECS for 4 ML vials can loaded into photoreactors one vial at a time and used similarly

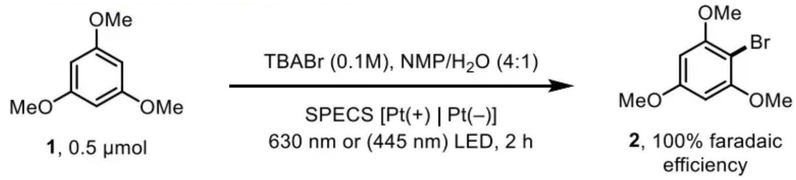
Illuminate the SPECS at your desired illumination level and duration.

SUGGESTED TEST REACTIONS AND COMPATIBILITY

Bromination of TMB

(Fig 1 in Nature 2025)

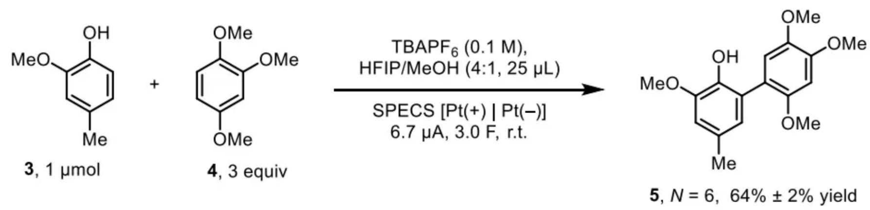
Oxidation reaction. Used as a calibration.



Phenol-Arene Cross Coupling via direct electrolysis (Waldvogel)

(Fig 2a in Nature 2025)

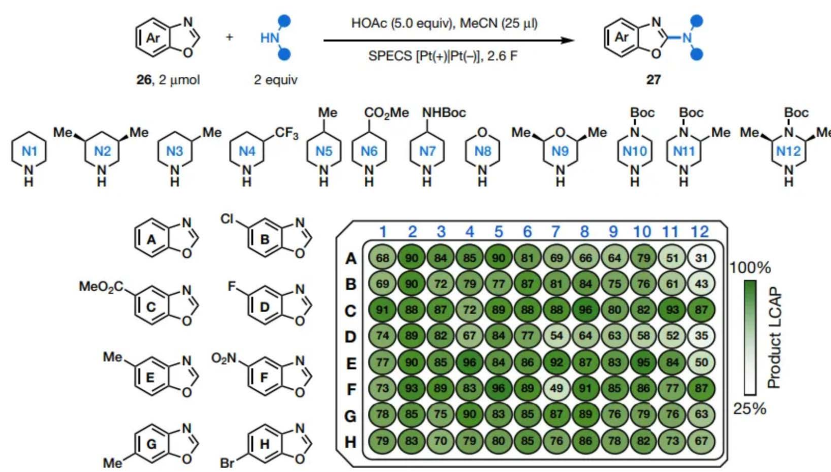
Anodic Oxidation. Direct electrolysis.



Library Synthesis

(Fig 3c in Nature 2025)

A library of medicinally relevant heterocycles using the electrochemical dehydrogenate C–H amination of benzoxazoles previously developed by Ackermann and colleagues. This reaction yields 2-aminobenzoxazoles, a structural unit found in numerous biologically active compounds.



Reagent Compatibility

SPECS devices were exposed to various acids and bases for 1 or 20 hours, then washed and tested via the standard TMB assay. Devices remained functional after treatment with TFA, HBF_4, and KOH, but are rapidly degraded by hydrofluoric acid sources.

		Working devices after:	
Entry	**Reagent**	**1 h**	**20 h**
1	20% TFA in H_2O	2/2	2/2
2	20% HBF_4 in H_2O	2/2	2/2
3	4M HCl in dioxane	2/2	2/2
4	20% KOH in H_2O	2/2	2/2
5	1M *t*BuOLi in THF	2/2	2/2
6	1M TBAOH in MeOH	2/2	2/2
7	1M TBAF in THF	2/2	2/2
8	KHF_2 solution in H_2O (sat.)	0/2	0/2
9	70% HF in pyridine	0/2	0/2
10	NEt_3•3HF (neat)	2/2	0/2

SPECS by OWiC TECHNOLOGIES

MORE INFORMATION

OWiC SPECS have been detailed in a landmark paper by Górski *et al.* in Nature 2025 that details reactions and reagents that are possible with SPECS.

For full details please see the Nature article linked below:
https://www.nature.com/articles/s41586-024-08373-1

nature

Article

Light-harvesting microelectronic devices for wireless electrosynthesis

https://doi.org/10.1038/s41586-024-08373-1
Received: 25 July 2024
Accepted: 8 November 2024
Published online: 8 January 2025
Check for updates

Bartosz Górski[1,4], Jonas Rein[1,4], Samantha Norris[2], Yanxin Ji[2], Paul L. McEuen[2,3]✉ & Song Lin[1,3]✉

High-throughput experimentation (HTE) has accelerated academic and industrial chemical research in reaction development and drug discovery and has been broadly applied in many domains of organic chemistry[1,2]. However, application of HTE in electrosynthesis—an enabling tool for chemical synthesis—has been limited by a dearth of suitable standardized reactors[3–7]. Here we report the development of microelectronic devices, which are produced using standard nanofabrication techniques, to enable wireless electrosynthesis on the microlitre scale. These robust and inexpensive devices are powered by visible light and convert any traditional 96-well or 384-well plate into an electrochemical reactor. We validate the devices in oxidative, reductive and paired electrolysis and further apply them to achieve the library synthesis of biologically active compounds and accelerate the development of two electrosynthetic methodologies. We anticipate that, by simplifying the way electrochemical reactions are set up, this user-friendly solution will not only enhance the experience and efficiency of current practitioners but also substantially reduce the barrier for nonspecialists to enter the field of electrosynthesis, thus allowing the broader community of synthetic chemists to explore and benefit from new reactivities and synthetic strategies enabled by electrochemistry[8–12].

We are constantly striding to expand OWiC SPECS compatibility with additional reactions and reagants. To discuss your needs beyond these resources, contact specs@owictech.com