

Materials List for:

Construction and Setup of a Bench-scale Algal Photosynthetic Bioreactor with Temperature, Light, and pH Monitoring for Kinetic Growth Tests

Amanda L. Karam¹, Catherine C. McMillan¹, Yi-Chun Lai¹, Francis L. de los Reyes III¹, Heike W. Sederoff², Amy M. Grunden², Ranji S. Ranjithan¹, James W. Levis¹, Joel J. Ducoste¹

¹Department of Civil, Construction, and Environmental Engineering, North Carolina State University

²Department of Plant and Microbial Biology, North Carolina State University

Correspondence to: Francis L. de los Reyes III at fdelosr@ncsu.edu

URL: <https://www.jove.com/video/55545>

DOI: [doi:10.3791/55545](https://doi.org/10.3791/55545)

Materials

Name	Company	Catalog Number	Comments
Cast acrylic sheets	McMaster Carr	8560K244	7/8" thick, 12 x 36", optically-clear, the size of sheets purchased will depend on reactor dimensions.
Acrylic cement	McMaster Carr	7517A4	Scigrip plastic pipe cement, #4SC nonwhitening for acrylic. Not needed if gaskets and screws are used for PBR assembly.
Acrylic cement applicator needle	McMaster Carr	75165A136	Acrylic cement applicator needle, 25 Gauge, 1", Stainless steel, PTFE lined.
Plastic dispensing bottle for acrylic cement	McMaster Carr	7544A67	Plastic dispensing bottle, 2-oz size, packs of 5.
Viscous acrylic cement	McMaster Carr	7515A11	Scigrip plastic pipe cement. Medium-bodied acrylic cement to seal in any gaps within PBR body.
PG-13.5 thread tap	McMaster Carr	2485A14	Can be used to help secure pH electrode to lid (if applicable).
PBR and lid	NCSU Precision Machine Shop	Karam Algae 3.2L Reactor Revision E	This machine shop is open to public for business. Contact shop manager.
pH sensor	Hamilton	238643	EasyFerm Plus 120, autoclavable, millivolt output.
Light sensor	Apogee Instruments	SQ-225	Amplified 0-5 volt electric calibration quantum sensor, water-proof.
Temperature sensor	LabJack	EI1034	Stainless steel, water-proof temperature sensor.
pH transmitter wire with BNC end	Sigma-Aldrich	HAM355173-1EA	This wire will vary with type of pH probe. Make sure wire is compatible with pH probe and has BNC connector end.
Unity gain pre-amplifier	Omega Engineering	PHTX-21	Signal processing amplifier for pH electrode needed for high-impedance pH readings.
Coaxial adapter, BNC female-to-binding post	Amazon	SMAKN B00NGD5K80	For connecting pH signal from pre-amplifier to microcontroller.
Capacitor (1000 uF)	Amazon	Nichicon BCBI4950	For low-pass filter.
Resistor (1000 ohm)	Radio Shack	2711321	For low-pass filter.
Hookup wire	RadioShack	2781222	For making low-pass filters, connecting sensors to microcontroller, and wiring motor.

Heat shrink tubing	RadioShack	2781611	For low-pass filter assembly.
Data acquisition and control unit	LabJack	LabJack U6	To process electrical signal from sensors and communicate with data acquisition and control software.
DAQFactory data acquisition software	DAQFactory	DAQFactory Express Release 5.87c Build: 2050	Free to download, for up to 10 channels.
Mini DC-gearmotor	McMaster Carr	6331K31	Motor for mixer impeller.
Impeller and shaft	N/A	N/A	Email authors for 3D files.
Variable DC power supply	Amazon	Tekpower HY1803D	Variable DC power supply, 0-18V @ 0-3A.
Grow Lamp	HydroGrow	SOL-1	This exact model is no longer available.
Incubator	Thermo Scientific	Precision Model 818	This particular incubator can withstand an internal heat source since this unit's cooling compressors run non-stop regardless of temperature setting.