BPP Bioportide™ Bacterial Transformation Kit for *cyanobacteria*

Cat. no. BPP-BPort-002

Product Overview

The BPP Bioportide™ kits provide a ready-to-use system for efficient transformation of cyanobacteria. The kit contains **lyophilized BPP Bioportide™**, and a separate vial of **sterile 50% glycerol** for storage at -20°C. BPP Bioportide™ facilitates the uptake of nucleic acids without preparing competent cells, heat shock, electroporation or conjugation.

Components Supplied

1. **BPP Bioportide™**: Contains HEPES and arginine as buffer material. One vial contains **1 µg** of lyophilized BPP Bioportide™ which is sufficient for **10 cyanobacteria transformation reactions**. After recovery, each reaction yields approximately 1 ml of transformed cells for plating. Kits are available in sizes 10, 30, 50 and 100 reactions.
2. **BPP Bioportide™ Buffer**: delivered in a separate vial that contains 500 µl of sterile 50% glycerol.

Storage, Handling and Stability

- Store lyophilized BPP Bioportides™ at **-20°C** or -80°C for long-term storage.
- The **BPP Bioportide™ buffer** can also be stored at **-20°C** or -80°C.
- Once dissolved, the **BPP Bioportide™ working solution** must be stored at **-20°C**.

Caution

BPP Bioportides™ should be handled with care. The effects of prolonged or unprotected exposure are unknown. Users should always follow mandatory lab safety regulations and especially adhere to the following safety standards:

- Avoid skin or eye contact. Wearing gloves and eye protection when handling the product is strongly recommended. In case of contact, rinse skin or eyes thoroughly with water immediately.
- Do not inhale or consume. Avoid the formation of and exposure to aerosols, e.g. by working under a safety cabinet or in well-ventilated workspaces. Avoid ingestion.
- Do not use it while pregnant or breastfeeding.
- Use only as described in this manual. Do not leave open on a bench.

Product Description

BPP Bioportide™ is a recombinant protein with a molecular weight of roughly **37.5 kDa**. The exact size depends on the variant of BPP Bioportide™. Variants differ in their cell-penetrating domains, which are designed for specific cell envelope compositions. The protein facilitates the transport of nucleic acids, ranging from **22 nt to >10 kb**, into cells of a wide range of organisms, i.e. bacteria, archaea, fungi, plants, and animals (depending on the BPP Bioportide™ in use). Both **RNA** and **DNA**, including single- and double-stranded, linear or circular forms, can be transferred reliably.
BPP Bioportides™ are designed for robust performance in extreme environments (up to 80°C, pH > 9.0, high salt concentrations).

Key Features

- No need for competent cells, heat shock, electroporation or conjugation.
- Please refer to our publication on cyanobacterial transformation (https://doi.org/10.3389/fpls.2026.1812316).
- Works with **nanogram** quantities of nucleic acids in ***cyanobacteria*** like ***Synechocystis or Synechococcus***. Efficient transformation, with up to ~350 CFU for *Synechocystis* sp. PCC 6803 / ~450 CFU for *Synechococcus elongatus* PCC 7942 both transformed with 10 ng of a pUC19 plasmid DNA (incubation time of 6 h).
- Stable integration of 3-kb exogenous DNA in *Synechocystis* and WT *Synechococcus* sp. UTEX 3153 using 10 ng of linear PCR product (incubation time 1 h, 3 CFU / 89 CFU, respectively).
- The standard reaction below uses a 10:1 BPP Bioportide™-to-nucleic-acid mass ratio. For short RNA (20–300 nt) or large plasmids (8–25 kb), use the Molar Ratio Calculator on our website to plan additional conditions
- Short and easy protocol. Less time per experiment, less DNA and less cells are needed compared to standard natural transformation.

General Considerations

- You can adapt our standard protocol as a starting point to the specific needs of your strain. If you need further guidance, please do not hesitate to contact us.
- Note that you do not have to conduct pretreatment of your cells. BPP Bioportide™ transformation works best with early to mid log phase cells. **The optimal OD_{750} is 0.4 – 0.6**.
- As the BPP Bioportide™ carrier domain has an affinity for polysaccharides, avoid those within the medium that you use for incubation.
- Consider using a known and easy to handle methylation adapted plasmid as control in addition to your main experiment.

General Transformation Protocol for *cyanobacteria*

1. **Material preparation**
    - Grow cells according to your standard protocol to an OD_{750} of 0.4 - 0.6. Centrifuge 50 ml of cells (4000 x g for 10 minutes at room temperature) and resuspend in 2 ml of appropriate medium (e.g. BG-11, AD-7).
    - At the end, one reaction of BPP Bioportides™ corresponds to a volume of transformed cells of 1 ml, which is available for plating. Please calculate the material for your planned experiments accordingly.
    - Prepare the **appropriate medium** (e.g. BG-11), **agar plates** with and without appropriate antibiotics and HATF membranes.
2. **Prepare BPP Bioportide™ Working Solution**
    - Add **10 µl of BPP Bioportide™ buffer** to one vial of BPP Bioportide™ (yielding a **100 ng/µl working solution**). Mix gently by pipetting.
    - Incubate at **room temperature** for **20 minutes** without agitating.
3. **Prepare Nucleic Acid Mixture**
    - Mix **1 µl** of nucleic acid (10 ng/µl) with **1 µl** of **BPP Bioportide™ Working solution**.
    - Mix gently by pipetting, incubate the mixture at **room temperature** for **10 minutes**.
4. **Transform the Cells**
    - Use **50 µl of the concentrated cell suspension** prepared in step 1
    - Add **50 µl** of cells to the BPP Bioportide™/nucleic acid mixture (**2 µl**; see step 3), mix gently by pipetting and keep at **room temperature** for **10 minutes without shaking**.
5. **Recover and Plate**
    - Add **950 µl of appropriate medium (e.g. BG-11)** to the cells and keep in continuous shaking (130 rpm, horizontally) and light (10 µmol photons m^{-2} s^{-1}) for **60 minutes**. In addition, test the standard incubation time of your strain, e.g. 6 hours.
    - Transfer cells to **HATF membrane on BG-11 agar plates without antibiotics** for **24 hours** under 10 µmol photons m^{-2} s^{-1}.
    - Transfer the membrane to BG-11 agar plates **with appropriate antibiotics**. Incubate under 20 µmol continuous photons m^{-2} s^{-1}. Colonies appear after approximately **7-10 days** of incubation.

Documentation and support

Customer and technical support

Visit www.bpp-peptides.com for the latest service and support information.

Limited product warranty

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Manufacturer

Better Peptides Platform GmbH, Waldshuter Straße 5, 68239 Mannheim, Germany

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Revision

The information in this user guide is subject to change without notice.

Latest version: November 2026

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