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# DATASHEET

## RuBi-Glutamate

### Product overview

<b>Name</b>	RuBi-Glutamate
<b>Cat No</b>	HB0567
<b>Description</b>	RuBi - caged glutamate compound. Water soluble.
<b>Biological description</b>	Ruthenium-bipyridine-trimethylphosphine (RuBi) - caged glutamate. Water soluble.

RuBi-Glutamate can be excited by visible wavelengths and releases glutamate after one- or two-photon excitation. Glutamate release occurs in less than 50 ns. Displays fewer non-specific effects than **MNI-caged-Glutamate**.

RuBi-Glutamate has a relatively high absorption cross section in the visible (blue) and has a high quantum efficiency of uncaging which allows use at low concentrations (e.g. lower concentrations than **MNI-Glu**). This partly avoids blockade of GABAergic transmission which occurs with other caged compounds.

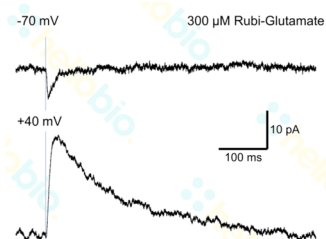
Two-photon uncaging of RuBi-Glutamate has a high spatial resolution and generates excitatory responses in individual dendritic spines with physiological kinetics. With laser beam multiplexing, two-photon RuBi-Glutamate uncaging can also be used to depolarize and fire pyramidal neurons with single-cell resolution.

Therefore, RuBi-Glutamate enables photoactivation of neuronal dendrites and circuits with visible or two-photon light sources at single cell and single spine precision.

When combined with RuBi-Glutamate uncaging, two-photon photostimulation can be applied to optically map inhibitory connections.

<b>Alternative names</b>	RuBi-Glu, RuBiGlu
<b>Biological action</b>	Caged compound
<b>Customer comments</b>	<i>Hello Bio produce very high quality Rubi-Glutamate, which is capable of evoking single spine synaptic currents following 2-photon activation. The spatial and temporal dynamics of the uncaging are suitable for fast photolysis, mimicking accurately endogenous glutamate release. <b>Verified customer, The University of Edinburgh</b></i>

### Images



Uncaging of RuBi-Glutamate using a 0.5  $\mu\text{m}$  spot of 780 nm light for 2 ms (blue line), 1  $\mu\text{m}$  adjacent to dendritic spines (average of 8 spine shown) in a CA1 pyramidal cell from a 26 day old rat. Traces were acquired using a cesium gluconate based intracellular solution in voltage-clamp configuration, in the presence of bath applied 300  $\mu\text{M}$  RuBi-Glutamate and 50  $\mu\text{M}$  Photolavin (also Hello Bio), producing small AMPA EPSCs at -70 mV (top) and large NMDA EPSCs at +40 mV (bottom).

### Biological Data

**Application notes**      Uncaging of Rubi-Glutamate using a 0.5 μm spot of 780 nm light for 2 ms (blue line), 1 μm adjacent to dendritic spines (average of 8 spine shown) in a CA1 pyramidal cell from a 28 day old rat.

Traces were acquired using a **cesium gluconate** based intracellular solution in voltage-clamp configuration, in the presence of bath applied 300 μM Rubi-Glutamate and 50 μM **picrotoxin** (also Hello Bio), producing small AMPA EPSCs at -70 mV (top) and large NMDA EPSCs at +40 mV (bottom).

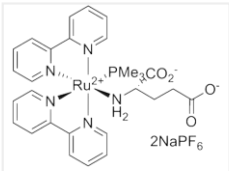
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## Solubility & Handling

**Storage instructions**      -20 °C  
**Solubility overview**      Soluble in water (20mM)  
**Handling**      This compound is light sensitive; exposure to light may affect compound performance. We therefore recommend storing the material in the dark and protecting from light.  
**Important**      This product is for RESEARCH USE ONLY and is not intended for therapeutic or diagnostic use. Not for human or veterinary use.

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## Chemical Data

**Chemical name**      (*bis*(2,2'-Bipyridine-*N,N'*)trimethylphosphine)-(S)-1-aminopropane-1,3-dicarboxylic acid ruthenium(2<sup>+</sup>) complex sodium hexafluorophosphate salt  
**Molecular Weight**      970.54  
**Chemical structure**      

**Molecular Formula**      C<sub>28</sub>H<sub>32</sub>N<sub>5</sub>O<sub>4</sub>PRu.2NaPF<sub>6</sub>  
**CAS Number**      2417096-44-5  
**PubChem identifier**      90488860  
**SMILES**      CP(C)C.C1=CC=NC(=C1)C2=CC=CC=N2.C1=CC=NC(=C1)C2=CC=CC=N2.C(CC(=O)[O-])C(C(=O)[O-])N.F[P-](F)(F)(F)F.F[P-](F)(F)(F)F.[Na+].[Na+].[Ru+2]  
**Source**      Synthetic  
**InChiKey**      SQQVSHWHIPVYSZ-UHFFFAOYSA-L  
**Appearance**      Orange solid

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## References

### RuBi-Glutamate: Two-Photon and Visible-Light Photoactivation of Neurons and Dendritic spines.

Fino E *et al* (2009) Front Neural Circuits 3  
**PubMedID**      [19506708](#)

### A fast ruthenium polypyridine cage complex photoreleases glutamate with visible or IR light in one and two photon regimes.

Salierno M *et al* (2010) J Inorg Biochem 104(4)  
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### Dense, unspecific connectivity of neocortical parvalbumin-positive interneurons: a canonical microcircuit for inhibition?

Packer AM *et al* (2011) J Neurosci 31(37)  
**PubMedID**      [21917809](#)

### Dense inhibitory connectivity in neocortex.

Fino and Yuste (2011) Neuron. 69(6)  
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