Supplemental Information

Development of a bioavailable Hg(II) sensing system based on MerR-regulated visual pigment biosynthesis

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AGATCTCTAAGGCATAGCTGACCTTGCCAGGCCTGCTTCGCCCTGTAGT
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merR
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CGGCCGCCTTGGCAAAAACGCCAATGGTCAGGTTTTCCAAATTATTTTCC
mer bidirectional promoter region
ATATCGCTTGACTCCGTACATGAGTACGGAAGTAAGGTTACGCTATCCAA
TCCAAATTCAAAAGGGCCAACGT**TCTAGA**AATAATTTTGTTTAACTTTAAG
rbs *NdeI* Violacein expression cassette *SacI*
AAGGAGATATACATATG—***vioA-vioB-vioC-vioD-vioE***—TAA**GAGCTC**CGT
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TCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCAC
T7 terminator
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pPmer-vio

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merR
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mer bidirectional promoter region
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rbs *Nde*I
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eGFP
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*Hin*dIII
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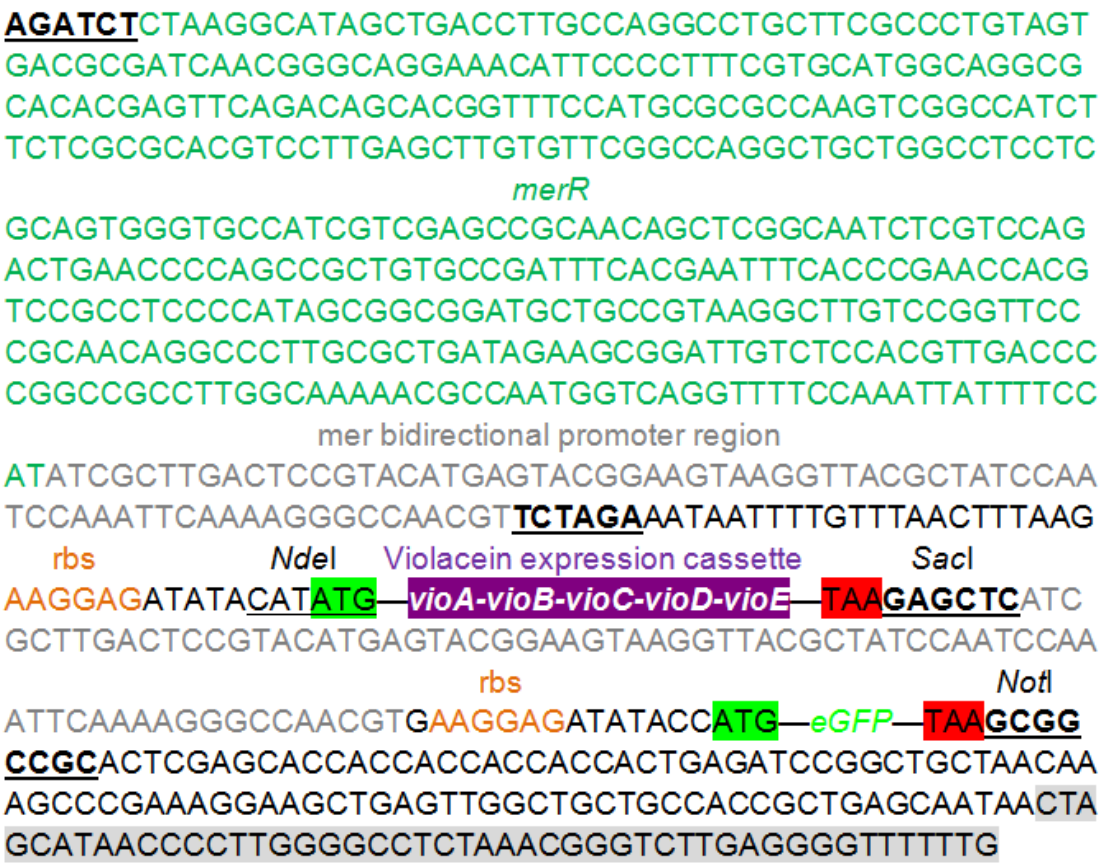
pPmer-G



pPmer-vio-Pmer-G

Fig S1. The cloning/expression region of vectors used in this study. DNA sequence and annotation data are all marked.

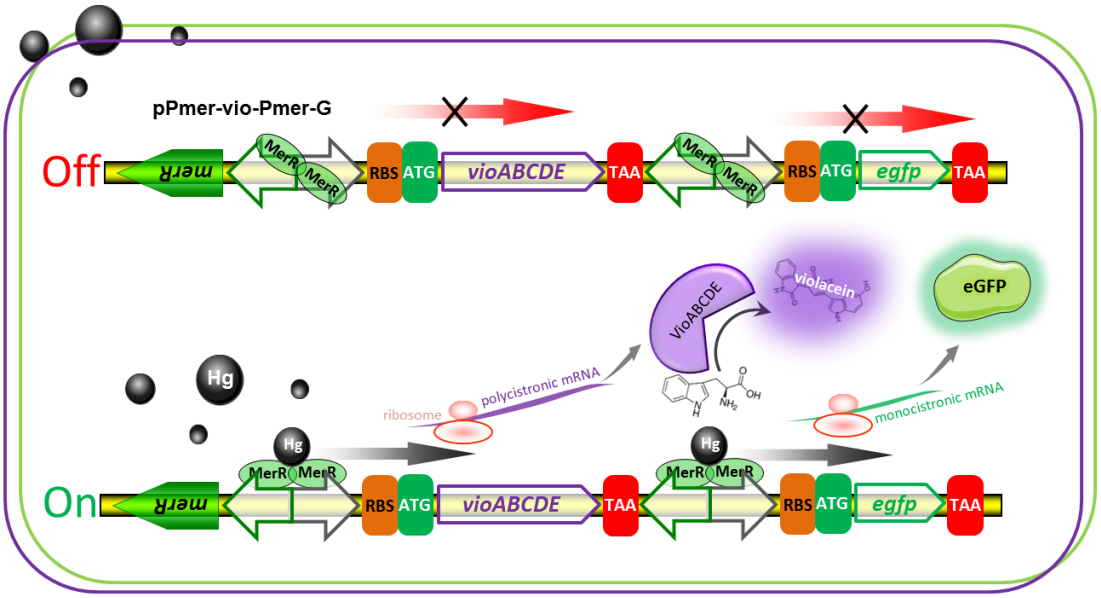


Fig S2. Genetic construct for sensing bioavailable Hg(II) with two reporters. The violacein biosynthesis module and eGFP reporter module were placed under the control of its own *mer* promoter separately in one genetic construct. Upon binding of bioavailable Hg(II) to the dimeric MerR, the protein-metal-ion complex switches from a repressor to an activator to allow the transcription of two reporters.

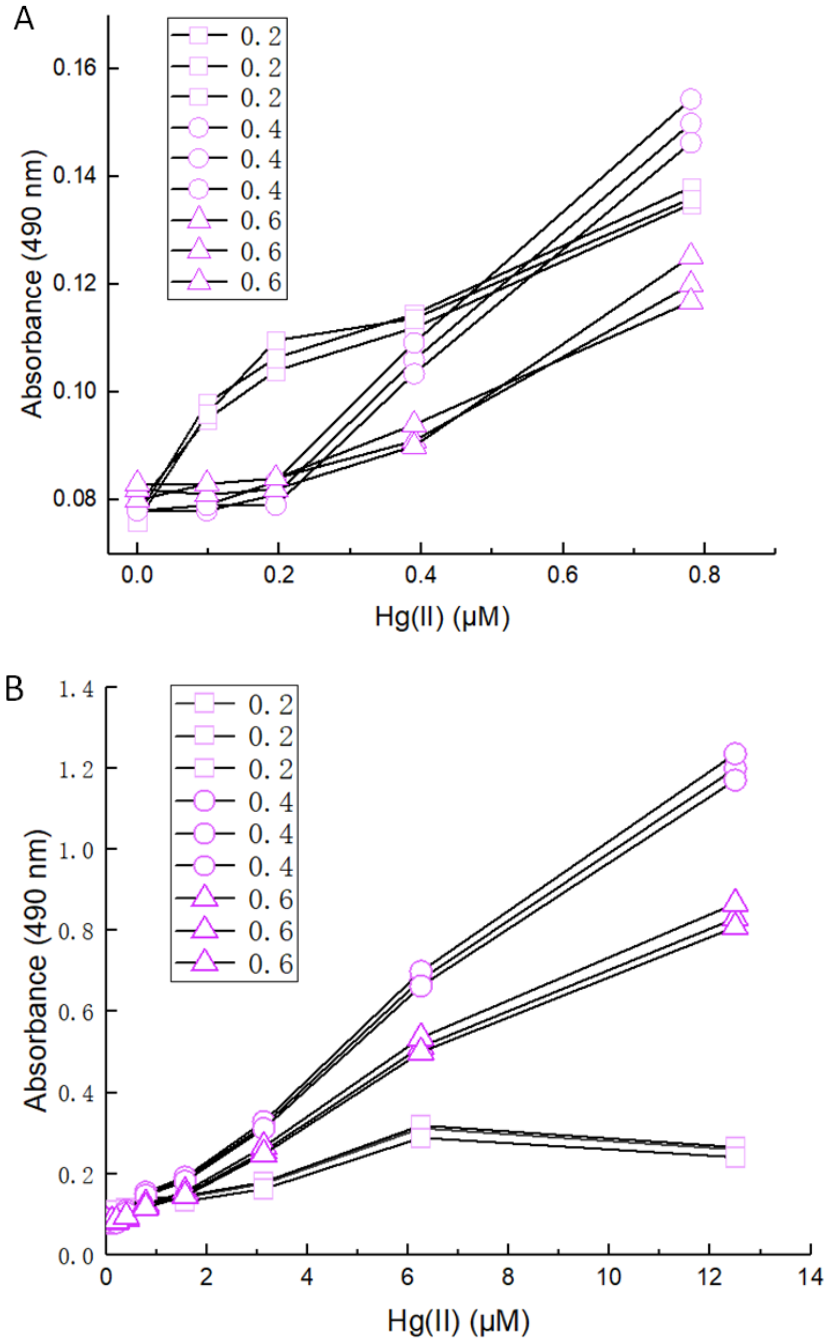


Fig S3. The response of whole-cell biosensor TOP10/pPmer-vio induced with increased concentrations of Hg(II). Early exponential-phase (OD_{600}=0.2), exponential-phase (OD_{600}=0.4), and late exponential-phase (OD_{600}=0.6) cultures (with three repeats) were induced with 0, 0.098, 0.195, 0.39, 0.78, 1.56, 3.125, 6.25, and 12.5 μM Hg(II) at 37 ^{o}C for 12 h. Whole-cell biosensor dose-response curves with Hg(II) concentrations range from 0-0.78 μM (A), and dose-response curves with Hg(II) concentrations range from 0-12.5 μM