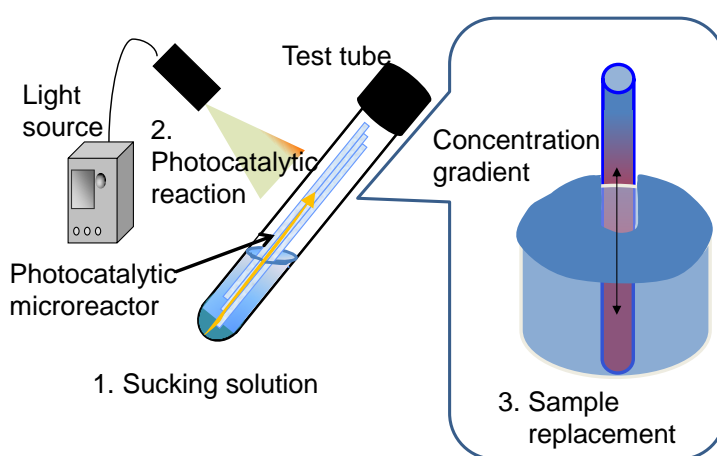


1 Electronic Supplementary Information (ESI):

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3 **Novel screening method of oxidation and reduction abilities**
4 **for photocatalytic materials**

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6 Kuwahara,^a A. Mase,^b T. Sugita,^b K. Mori^b



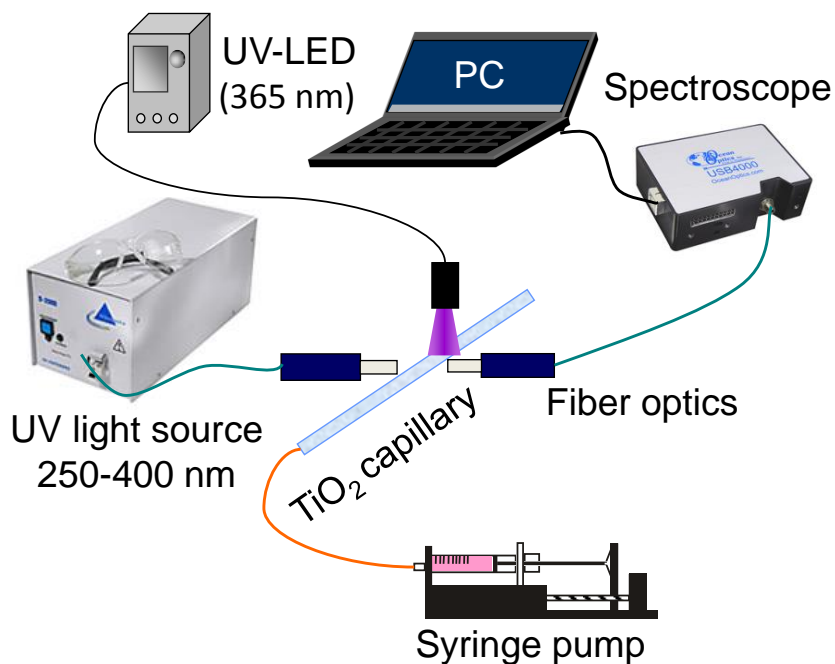
11 Fig. S1 Schematic figure of the automated photocatalytic reactor without any electrical power
12 source. Five photocatalytic microreactors are bundled, and put it into a test tube, where the reactant
13 solution was. The photocatalytic microreactors coated with photocatalytic materials take up the
14 solution due to capillary forces. By irradiation of light to the upper region of the photocatalytic
15 microreactors, chemicals there are decomposed, and a gradient is formed in the concentration of the
16 chemicals in the vertical direction inside the microreactors. Due to this gradient, the chemicals left
17 in the bulk solution are continuously drawn into the photocatalytic reactor, and the chemicals are
18 replaced. The reaction continues until the chemicals are consumed.

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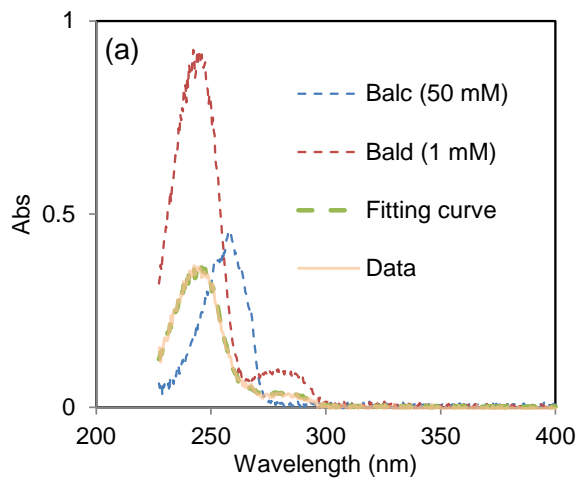
Fig. S2 Merry-go-round reaction system for photocatalytic reactions. Eight test tubes can be set up at the same time.



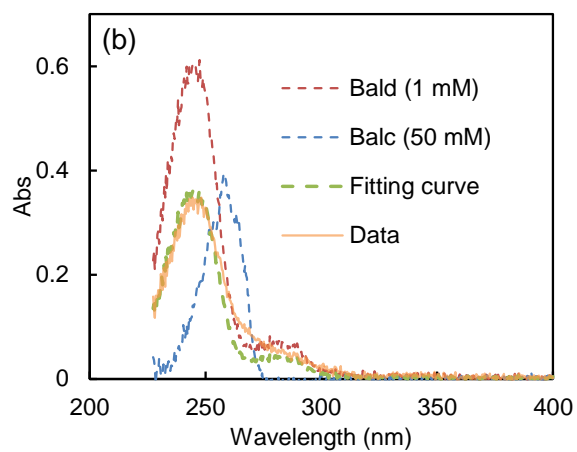
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8 Fig. S3 The reaction monitoring system, where the photocatalytic reaction was monitored directly
9 inside the photocatalytic microreactor. The photocatalytic reaction was induced by UV-LED with
10 the wavelength of 365 nm, and a white UV light was irradiated via an optical fiber and the UV
11 spectrum was obtained from the transmission.

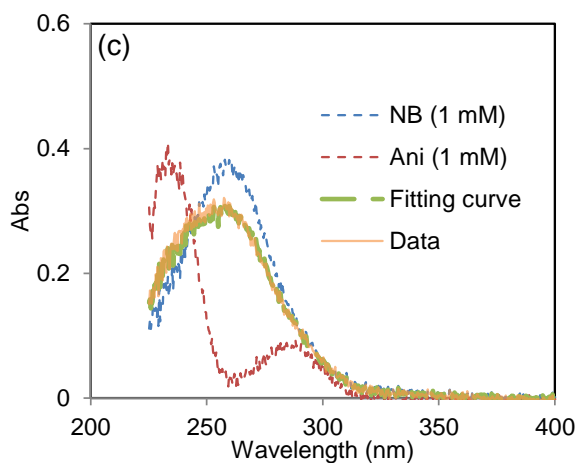
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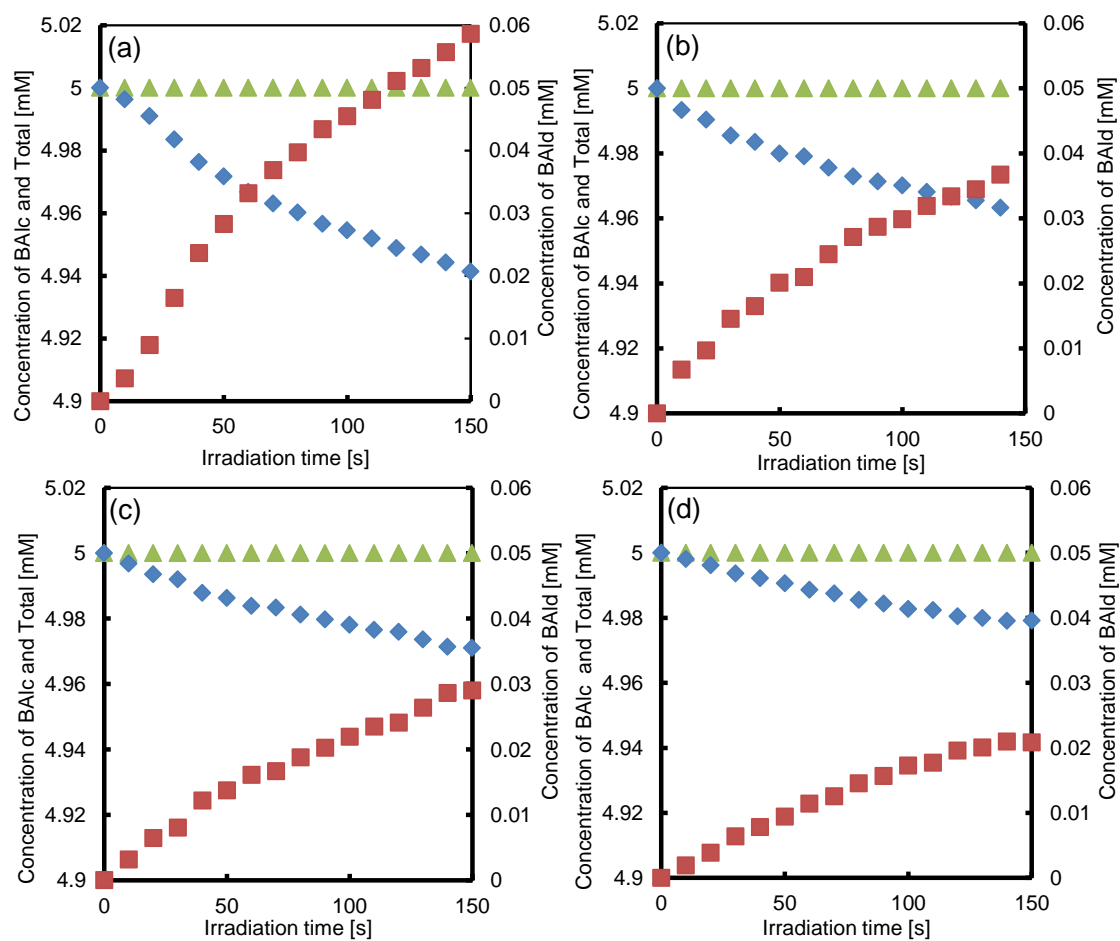
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6 Fig.S4 An example of the fitting of the spectrum obtained in (a) oxidation reaction of
7 benzylalcohol at 30 s after the photoirradiation, (b) reduction reaction of benzaldehyde at 120 s, (c)
8 reduction reaction of nitrobenzene at 30 s. The data spectrum was fitted with the sum of the
9 reference spectrum of the corresponding reactant and product.



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Fig.S5 Temporal change of the reactant and product concentration in the oxidation reaction in the photocatalytic microreactors by using various visible photocatalysts; (a) WO₃, (b) N-TiO₂, (c) N-Si-TiO₂, (d) V-N-Si-TiO₂. In the graphs, the concentrations for the benzylalcohol, benzaldehyde and total were represented with square, diamond, and triangle, respectively.