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One-Step Green Synthesis of 2D Ag Dendrites-Embedded Biopolymer Hydrogel Beads for Catalytic Reactor

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Supporting Tables

Table S1. Activity parameter, κ, values for various heterogeneous catalysts, which is obtained by dividing the reaction rate constant by the total weight of used catalyst.

Heterogeneous catalysts	Total weight of used catalyst [mg]	Reaction rate constant (*k*) [10^{-3} s^{-1}]	κ [$s^{-1}g^{-1}$]	Ref.
Hollow PS/Au-Hollow PS/Au-Ag NPs	0.40	2.14	**5.35**	1
Hollow PS/Pt-Ag NPs	0.40	4.57	**33.43**	1
PS with an open hole/Ag NPs	0.12	1.74	**14.5**	2
Porous PS/Ag NPs	0.15	5.79	**38.6**	3
Cross-linked PS/Au NPs	100	25	**0.25**	4
Hybrid cryogel/Ag NPs	20	5.03	**0.25**	5
Sodium polyacrylate water ball/Ag NPs	20	7.67	**0.38**	6
Mg-Al layer double hydroxide/Au-Ag NPs	1	0.48	**0.48**	7
Spherical covalent organic framework/Ag NPs	25	17.67	**0.71**	8
Covalent organic framework@Fe3O4/Au NPs	3	3.7	**1.23**	9
Spindle-shaped PANI/Au NPs	31.5	40.4	**1.28**	10
SiO2@PPy/Au NPs	31.5	44.2	**1.4**	11
Heterocycle-modified PS/Au NPs	15	30.7	**2.05**	12
Ni@SiO2 magnetic hollow microspheres/Au	4	10	**2.5**	13
ZnO@Fe3O4/Ag NPs	3	8.18	**2.73**	14
Self-assembly of surface-modified Au NPs	0.9	2.58	**2.87**	15
Fe3O4@PS/Ag	2	8.9	**4.45**	16
Ca-Al layer double hydroxide hybrid@Fe3O4/Ag NPs	1	5.3	**5.3**	17
CNT@PZS/Au NPs	0.3	1.78	**5.93**	18
MWCNT@S.lavandulifolia/Ag NPs	3	19.2	**6.4**	19
Graphitic carbon nitride/Au NPs	2	15	**7.5**	20
Silica nanosheet/Ag NPs	10	80.19	**8.02**	21
PAM@PPy@GO/Ag NPs	4	33.8	**8.45**	22
Metal-organic framework/Au NPs	1.5	24.2	**16.13**	23
CaCO3/Au NPs	1	18	**18**	24
Thiol-functionalized nGO@PEG/Au NPs	0.07	1.73	**24.71**	25
Fe3C@NG/Au	0.5	17	**34**	26
Alginate bead/Ag dendrites	0.4	16.09	**40.23**	This work

Supporting Figures

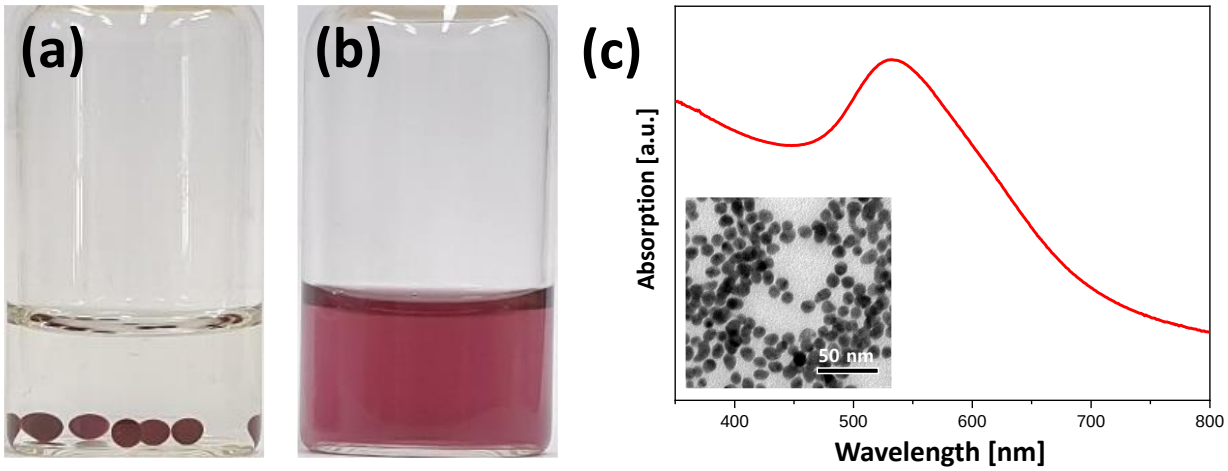

Fig. S1. Photographs of droplets of aqueous alginate solution containing Au nanocrystals dropped into (a) 0.125 M $AgNO_3$ aqueous solution and (b) pure water. (c) UV-vis absorbance spectrum and TEM image of Au nanocrystals used as pigments in this experiment.

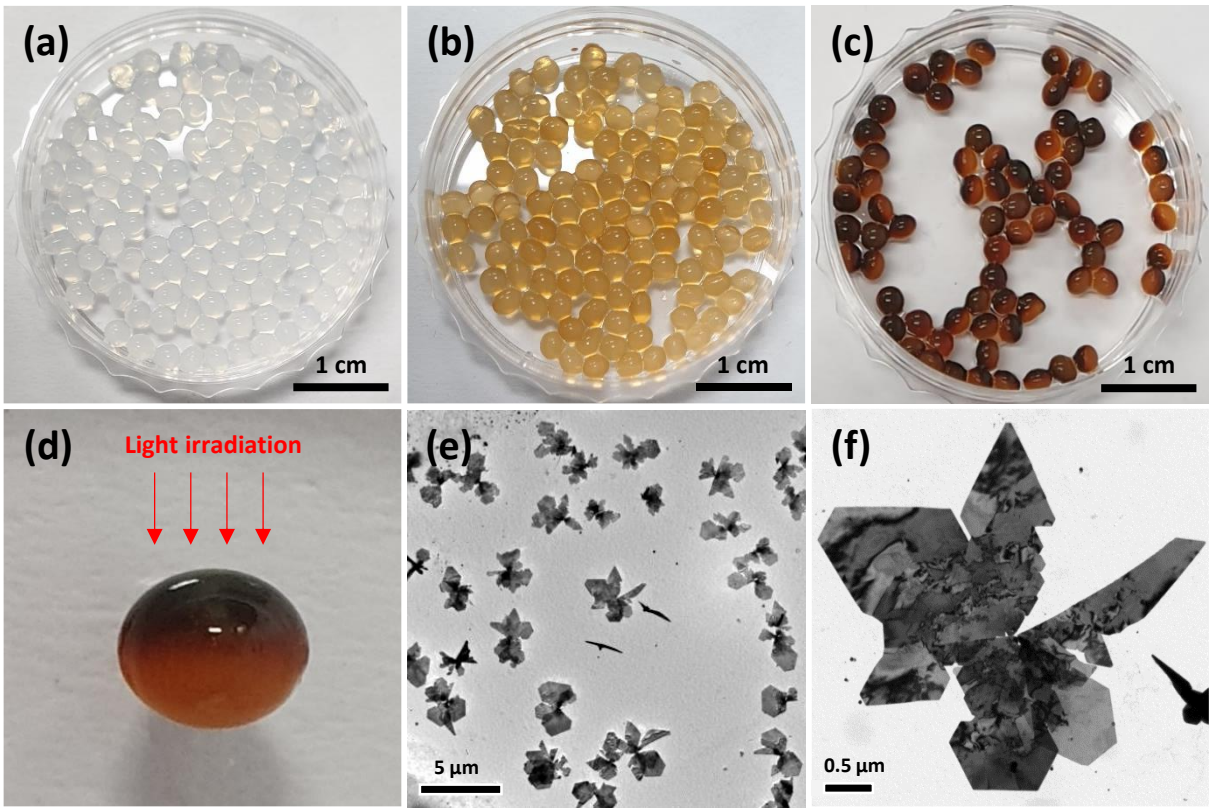

Fig. S2. Photographs of hydrogel beads which was aged in the aqueous solution containing $AgNO_3$ (a) in the darkroom for 3 h and (b) under the sun light for 3 h. (c)-(d) Photographs of alginate beads obtained after immersing in 0.125 M $AgNO_3$ and aging at room temperature for 3 hours under light irradiation. In this experiment, Xenon lamp was used instead of UV lamp and the beads were exposed to light without stirring. (e)-(f) TEM images of Ag nanocrystals formed in the alginate beads shown in (c)-(d).

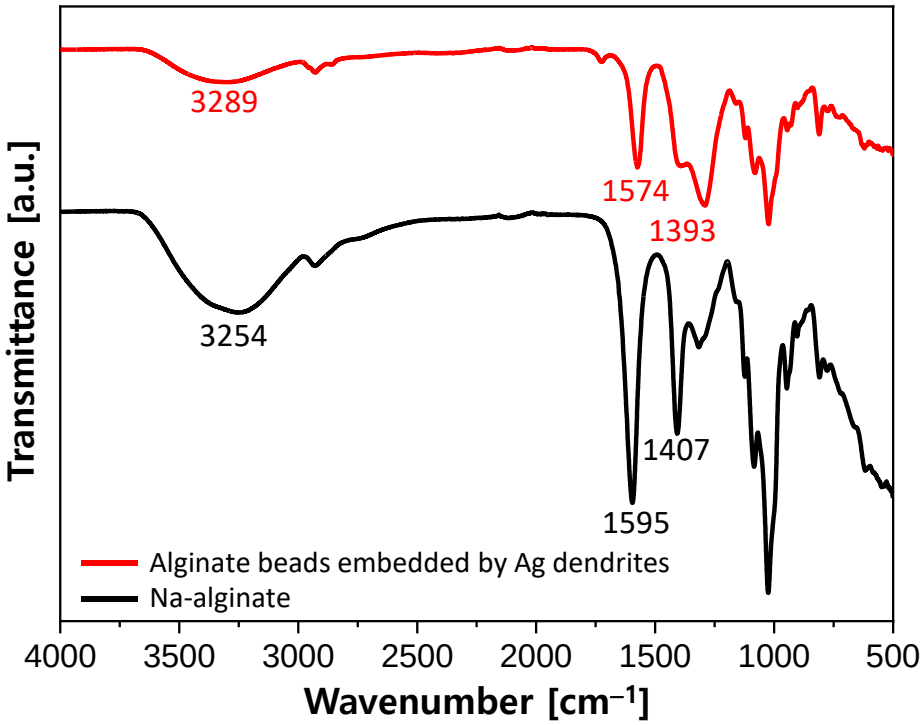

Fig. S3. FTIR spectra of pure Na-alginate (red) and alginate beads embedded with 2D Ag dendrites (black).

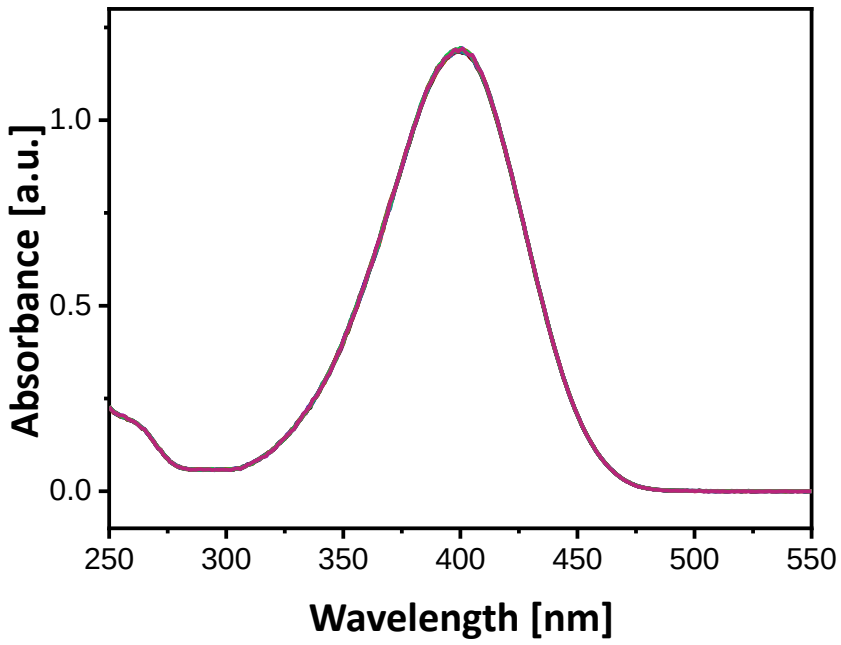

Fig. S4. UV–Vis absorption spectra for 10 min after the alginate hydrogel beads cross-linked by Ba^{2+} ions (i.e., not covered with Ag nanocrystals) were added to the solution that contained $NaBH_4$ and 4-NP.

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