Direct 3D Printing of Reactive Agitating Impellers for the Convenient Treatment of Various Pollutants in Water

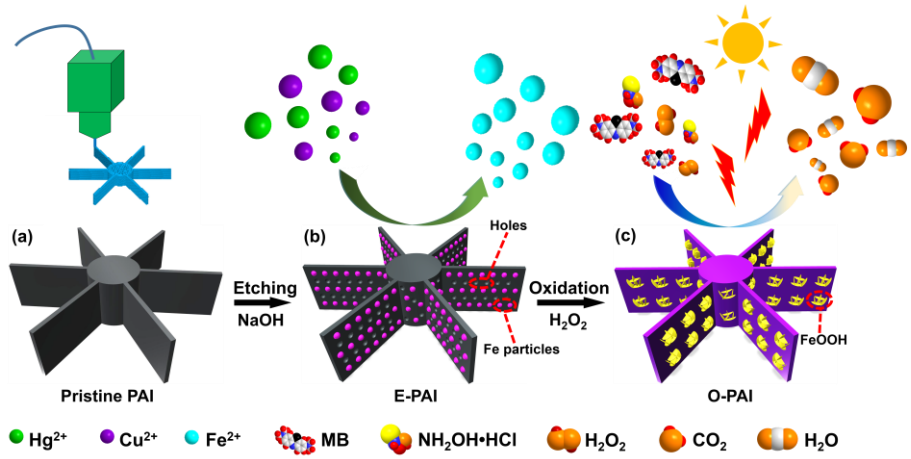

Figure 1. Schematic illustration of the preparation procedure of 3D printed AI for water treatment. a) 3D printing of pristine PAI; b) the E-PAI for removal of metal ions; c) the prepared O-PAI was used to catalyze Fenton reaction.

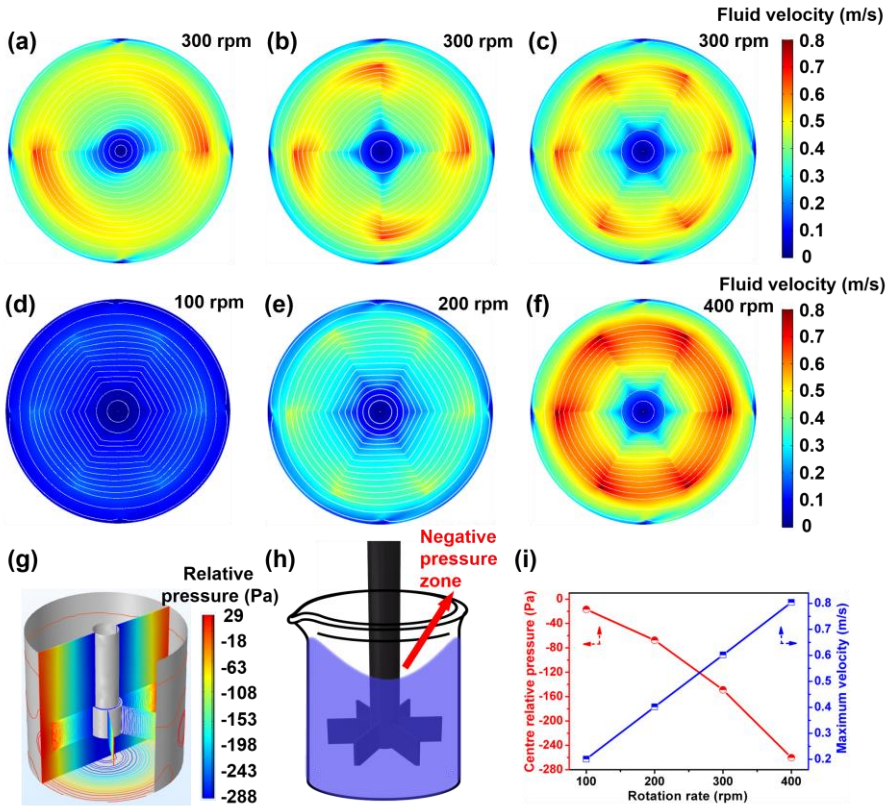

Figure 2. a-c) Velocity field of numerical simulation analysis of the as-made samples with different blades at 300 rpm: a) two blades, b) four blades, and c) six blades. d,e) Velocity field numerical simulation analysis of O-PAI-120 with six blades at different rotational speed of mechanical agitator: d) 100 rpm, e) 200 rpm, f) 400 rpm. g) Pressure field distribution of

numerical simulation analysis and h) an illustration of fluid state during agitation in a typical Fenton reaction at 400 rpm; i) relative pressure in center of beaker and maximum velocity at the end of blades varies with rotational speed of mechanical agitator.

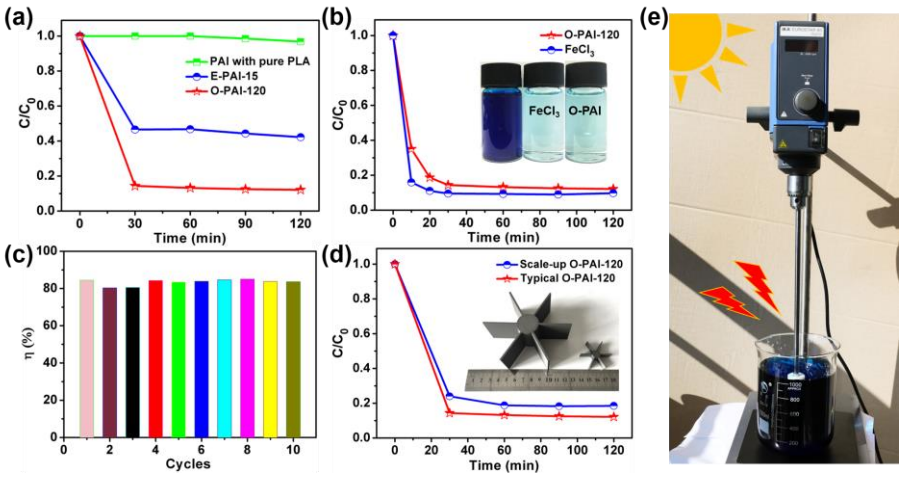

Figure 3. The degradation of MB under visible light irradiation in different reaction systems: a) catalyzed by PAI with pure PLA, E-PAI-15, and O-PAI-120, the other conditions keep the same, b) using the as-made O-PAI-120 and homogeneous catalyst of FeCl3 and inset: photographs of an aqueous solution of MB at 0 min (left), after 30 min catalyzed using FeCl3 (middle), and O-PAI-120 (right), respectively. c) Recycling tests in the presence of O-PAI-120 (measured at 30 min after Fenton reaction). d) The degradation of MB (100 ppm, 800 mL) catalyzed by the scale-up O-PAI-120 (the photographs were shown inset) under sunlight and the degradation of MB (100 ppm, 80 mL) catalyzed by the typical O-PAI-120; e) The photographs of scale-up O-PAI-120 used for Fenton reaction under sunlight.

References:

[1] X. Y. Sun, Y.Yan, L. J. Zhang, G. X. Ma, Y. Liu, Y. X. Yu, Q. An, and S. Y. Tao*, "Direct 3D Printing of Reactive Agitating Impellers for the Convenient Treatment of Various Pollutants in Water", ***Advanced Materials Interfaces***, 2018, 5, 1701626.