Supporting Information

Silver modified barium titanate as a highly efficient piezocatalyst

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Supporting information 1:

The high-resolution transmission electron microscopy (HRTEM) image and selected area electron diffraction (SAED) pattern of BTO-Ag 60 min sample have confirmed that BaTiO$_3$ nanoparticles are in single-crystalline form. Fig. S1b is the enlarged TEM image that marked by a red square in Fig. S1a. It shows that the lattice fringes extend throughout the BTO nanoparticle and the corresponding SAED pattern (Fig. S1c) demonstrates sharp and bright dots. Both images indicated the BaTiO$_3$ is in a single crystalline structure.

![Fig. S1](image)

Supporting information 2:

Other noble metal (Au) modified BaTiO$_3$ and Ag modified other piezoelectric materials (ZnO) also exhibit the same enhanced piezocatalytic performance as Ag modified BaTiO$_3$ do. The results are shown in Fig. S2 and Fig. S3. The observed $k$ value of BTO-Au is almost two times higher than that of pure BTO (see Fig. S2 c). Similarly, the observed $k$ value of Ag modified ZnO is almost two times as high as that of pure ZnO (see Fig. S3 c).

Au modified BaTiO$_3$ was synthesized using the same synthesis process as BTO-Ag. The only difference is to use HAuCl$_4$ to replace AgNO$_3$. The irradiation time is set to be 90 min because Au is more difficult to deposit than Ag under the same conditions. Ag modified ZnO was synthesized using the same synthesis process as BTO-Ag. The only difference is to change BaTiO$_3$ to ZnO without prior annealing treatment. The irradiation time is 60 min.

![Fig. S2](image)
Fig. S3 (a) The piezocatalytic activity of pure BTO and ZnO-Ag for MO degradation under ultrasonic vibration; (b) Plots of ln\((C_0/C)\) against vibration time of pure BTO and Zn-Ag; (c) The observed kinetic rate constant \(k_{obs}\) values from fitting the linear plot of ln\((C/C_0)\) vs. \(t\).