Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

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.

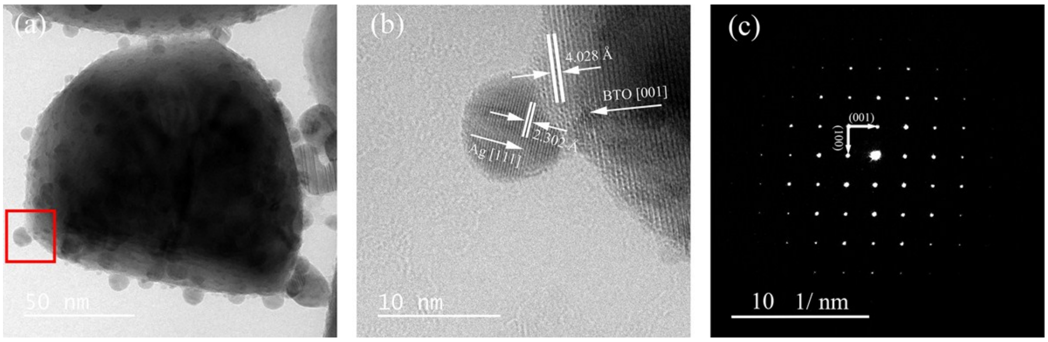

Fig. S1 (a) TEM image of BTO-Ag 60 min. (b) Enlarged HRTEM image marked by red square in Fig. S1 (a). (c) The corresponding SAED patterns of $BaTiO_3$.

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.

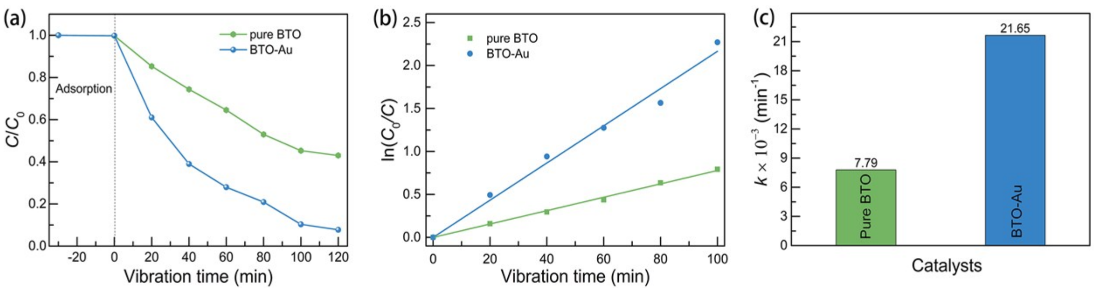

Fig. S2 (a) The piezocatalytic activity of pure BTO and BTO-Au for MO degradation under ultrasonic vibration; (b) Plots of $\ln(C_0/C)$ against vibration time of pure BTO and BTO-Au ;(c) The observed kinetic rate constant k_{obs} values from fitting the linear plot of $\ln(C/C_0)$ *vs*. *t*.

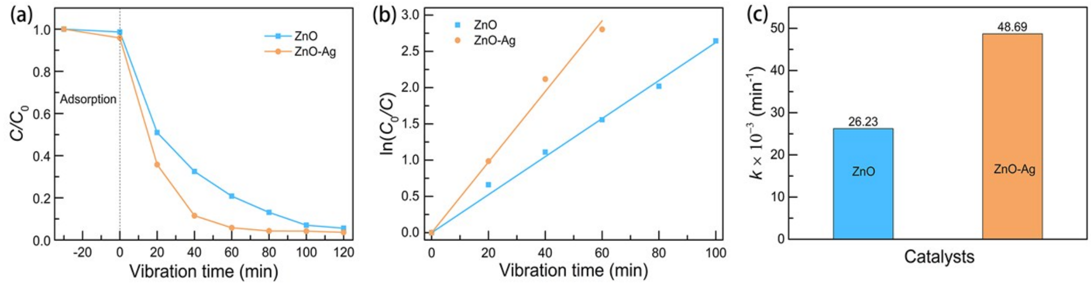

Fig. S3 (a) The piezocatalytic activity of pure BTO and ZnO-Ag for MO degradation under ultrasonic vibration; (b) Plots of ln(C_0/C) against vibration time of pure BTO and Zn-Ag ;(c) The observed kinetic rate constant k_{obs} values from fitting the linear plot of ln(C/C_0) *vs*. *t*.