

Supplementary Figure S1. Characteristics of ITO NPs used in this study. (A) FE-SEM analysis of ITO NPs prepared in culture medium. (B) Stability of ITO NPs in the medium dispersions. Light scattering intensities were measured by DLS. (C) Size distribution of ITO NPs measured using the qNano particle counter. (D) Summary of diameter (D_{10} , D_{50} , D_{90} , and mean) and concentration of ITO NPs prepared in this study as described in Materials and Methods.

Supplementary Figure S2. Effects of CM obtained from dTHP-1 cells treated with ITO NPs for 72 h on the morphology of A549 cells. The cells were treated with control medium or various dilutions of CM obtained from dTHP-1 cells treated with $50 \times 10^9/\text{mL}$ ITO NPs for 72 h. The cells were stained with Hoechst 33342 and CellTracker Red CMPTX dye and visualized under a CQ1 confocal quantitative image cytometer (upper panels). Cell circularity and aspect ratio were analyzed as described in Materials and Methods. Values are means, $n = 1000$, one-way ANOVA followed by Tukey's multiple comparison test. $**P < 0.01$, compared with untreated control.

Supplementary Figure S3. Effects of CM obtained from dTHP-1 cells treated with ITO NPs for 24 h on the morphology of A549 cells. (A) Microscopic images of A549 cells. A549 cells were exposed to CM from ITO NP-treated dTHP-1 cells for 72 h. (B) Quantitative analysis of cell morphologies altered by EMT induction. A549 cells were treated with CM from ITO NP-treated dTHP-1 cells for 72 h and stained with Hoechst 33342 and CellTracker Red CMPTX dye. The cells were visualized under a CQ1 confocal quantitative image cytometer (upper panels). Cell circularity and aspect ratio were analyzed as described in Materials and Methods. Values are means, $n = 1000$, one-way

ANOVA followed by Tukey's multiple comparison test. $**P < 0.01$, compared with untreated control.

Supplementary Figure S4. Cytotoxicity of SiO₂ NPs and TiO₂ NPs toward dTHP-1 cells. (A and B) Size distributions of SiO₂ NPs and TiO₂ NPs measured using the qNano particle counter. (C) Summary of diameters (D₁₀, D₅₀, D₉₀, and mean) and concentrations of SiO₂ NPs and TiO₂ NPs prepared in this study as described in Materials and Methods. (D and E) Effects of SiO₂ NPs and TiO₂ NPs on mitochondrial activity. dTHP-1 cells were exposed to SiO₂ NPs and TiO₂ NPs for 72 h. Mitochondrial activity was measured by conducting the WST-1 assay, and the results are expressed as percentage of untreated controls. Values are means \pm SD, n = 3, one-way ANOVA followed by Tukey's multiple comparison test. $**P < 0.01$, compared with untreated control.

Supplementary Figure S5. Effects of CM from SiO₂ NP- or TiO₂ NP-treated dTHP-1 cells on the induction of EMT in A549 cells. (A) Quantitative analysis of A549 cell morphology. The cells were exposed to CM from SiO₂ NP- (2×10^9 /mL) or TiO₂ NP- (50×10^9 /mL) treated dTHP-1 cells for 72 h and stained with Hoechst 33342 and CellTracker Red CMPTX dye. The cells were visualized under a CQ1 confocal quantitative image cytometer (upper panels). Cell circularity and aspect ratio were analyzed as described in Materials and Methods. Values are means, n = 1000, one-way ANOVA followed by Tukey's multiple comparison test. $**P < 0.01$, compared with untreated control. (B) Wound healing assay of A549 cells. The cells were exposed to CM from SiO₂ NP- (2×10^9 /mL) or TiO₂ NP- (50×10^9 /mL) treated dTHP-1 cells for 72 h. Images and wound confluence values were obtained using a LionHeart FX Automated Live Cell Imager and

Gen5 software, respectively. Values are means \pm SD, n = 3, two-way ANOVA followed by Tukey's multiple comparison test. $**P < 0.01$, compared with the corresponding time point of untreated control. (C) mRNA expression levels of *E-cadherin*, *vimentin*, *fibronectin*, and *ZEB1* in A549 cells. The cells were exposed to CM from SiO₂ NP- (2×10^9 /mL) or TiO₂ NP- (50×10^9 /mL) treated dTHP-1 cells for 72 h. Each mRNA expression level was normalized to the corresponding β -actin value and is presented as relative units compared with untreated control. Values are means \pm SD, n = 3, one-way ANOVA followed by Tukey's multiple comparison test. $*P < 0.05$, $**P < 0.01$, compared with untreated control. (D) Western blot analysis and quantification of E-cadherin, vimentin, and occludin in A549 cells. The cells were exposed to CM from SiO₂ NP- (2×10^9 /mL) or TiO₂ NP- (50×10^9 /mL) treated dTHP-1 cells for 72 h. Images are representative of three independent experiments. GAPDH was used as internal control. Values are means \pm SD, n = 3, one-way ANOVA followed by Tukey's multiple comparison test. $*P < 0.05$, $**P < 0.01$, compared with untreated control. (E) Immunofluorescence analysis of E-cadherin in A549 cells. The cells were exposed to CM from SiO₂ NP- (2×10^9 /mL) or TiO₂ NP- (50×10^9 /mL) treated dTHP-1 cells for 72 h. Nuclei were stained with NucBlue. Fluorescence images were obtained by using a BZ-X710 fluorescence microscope.

Supplementary Figure S6. Effects of SiO₂ NPs and TiO₂ NPs on protein release and transcript levels of IL-1 β and IL-8 in dTHP-1 cells. (A) Protein release and (B) transcript levels of IL-1 β in dTHP-1 cells treated with SiO₂ NPs and TiO₂ NPs. (C) Protein release and (D) transcript levels of IL-8 in dTHP-1 cells treated with SiO₂ NPs and TiO₂ NPs. The dTHP-1 cells were exposed to SiO₂ NPs and TiO₂ NPs for 72 h. IL-

1 β and IL-8 released into culture medium were determined using ELISA. The mRNA levels of *IL-1 β* and *IL-8* were determined by quantitative real-time PCR analysis. Each mRNA expression level was normalized to the corresponding *β -actin* value and is presented as relative units compared with untreated control. Values are means \pm SD, n = 3, one-way ANOVA followed by Tukey's multiple comparison test. ****P < 0.01**, compared with untreated control.

Supplementary Figure S7. Effects of rhIL-8 on the induction of EMT in A549 cells.

(A) Quantitative analysis of morphological changes induced by rhIL-8 treatment. The cells were treated with various concentrations of rhIL-8 for 72 h and stained with Hoechst 33342 and CellTracker Red CMPTX dye. The cells were visualized under a CQ1 confocal quantitative image cytometer (upper panels). Cell circularity and aspect ratio were analyzed as described in Materials and Methods. Values are means, n = 1000, one-way ANOVA followed by Tukey's multiple comparison test. ***P < 0.05**, compared with untreated control. (B) Wound healing assay of A549 cells treated with rhIL-8. The cells were exposed to 1 ng/mL rhIL-8 for 72 h. Images and wound confluence values were obtained using a LionHeart FX Automated Live Cell Imager and Gen5 software, respectively. Values are means \pm SD, n = 3, two-way ANOVA followed by Tukey's multiple comparison test. ***P < 0.05**, compared with the corresponding time point of untreated control. (C) mRNA expression levels of *E-cadherin*, *vimentin*, *fibronectin*, *ZEB1*, *Snail*, and *Slug* in A549 cells treated with 1 ng/mL rhIL-8. Each mRNA expression level was normalized to the corresponding *β -actin* value and is presented as relative units compared with untreated control. Values are means \pm SD, n = 3, unpaired two-tailed Student's *t*-test. (D) Immunofluorescence analysis of E-cadherin in A549 cells treated

with 1 ng/mL rhIL-8. Nuclei were stained with NucBlue. Fluorescence images were obtained by using a BZ-X710 fluorescence microscope.

Supplementary Figure S8. Involvement of NLRP3 inflammasome activation in IL-1 β release from ITO NP-treated dTHP-1 cells. (A) IL-1 β release from dTHP-1 cells or THP1-defNLRP3 cells treated with ITO NPs. The cells were treated with ITO NPs for 72 h, and IL-1 β released into culture medium was determined using ELISA. Values are means \pm SD, n = 3, one-way ANOVA followed by Tukey's multiple comparison test. **** P < 0.01**, compared with cells treated with ITO NPs at the corresponding concentrations. (B and C) Quantitative analysis of A549 cell morphology. The cells were exposed to CM from ITO NP-treated dTHP-1 cells or THP1-defNLRP3 cells for 72 h and stained with Hoechst 33342 and CellTracker Red CMPTX dye. The cells were visualized under a CQ1 confocal quantitative image cytometer. Cell circularity and aspect ratio were analyzed as described in Materials and Methods. Values are means, n = 1000, one-way ANOVA followed by Tukey's multiple comparison test. **** P < 0.01**, compared with cells treated with CM from dTHP-1 cells or THP1-defNLRP3 cells exposed to ITO NPs at the corresponding concentrations.

Supplementary Figure S9. Effects of anti-IL-1 receptor antibody (IL-1R1 Ab) on rhIL-1 β -treated A549 cells. (A) Effects of IL-1R1 Ab on the mRNA levels of *IL-8*, *IL-6*, and *TNF- α* in rhIL-1 β -treated A549 cells. The A549 cells were pretreated with 5 μ g/mL IL-1R1 Ab or 5 μ g/mL control IgG for 16 h and then exposed to 100 pg/mL rhIL-1 β for 72 h. Each mRNA expression level was normalized to the corresponding *β -actin* value and is presented as relative units compared with untreated control. Values are means \pm

SD, n = 3, one-way ANOVA followed by Tukey's multiple comparison test. $**P < 0.01$, compared with untreated control. (B) Microscopic images of A549 cells treated with 100 pg/mL rhIL-1 β in the presence or absence of 5 μ g/mL IL-1R1 Ab for 72 h.

Supplementary Movie S1. Wound healing assay of untreated A549 cells. Time-lapse images show the migration of A549 cells in the wound healing assay. Images were taken every hour for 72 h.

Supplementary Movie S2. Wound healing assay of A549 cells treated with CM from untreated dTHP-1 cells. Time-lapse images show the migration of A549 cells in the wound healing assay carried out after the exposure to CM from untreated dTHP-1 cells. Images were taken every hour for 72 h.

Supplementary Movie S3. Wound healing assay of A549 cells exposed to CM from ITO NP-treated dTHP-1 cells. Time-lapse images show the migration of A549 cells in the wound healing assay carried out after the exposure to CM from dTHP-1 cells treated with 50×10^9 /mL ITO NPs. Images were taken every hour for 72 h.