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## Performance-enhanced ZnO nanorod-based piezoelectric nanogenerators on double-sided stainless steel foil

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**Abstract.** We report on the enhancement of the output voltage from ZnO nanorod (NR)-based piezoelectric nanogenerators (PNGs) fabricated by using a double-sided stainless steel (SUS) substrate. The ZnO NRs were successfully grown on both sides of the SUS substrate by using a hydrothermal method. The ZnO NRs showed different crystalline quality on the front and back sides of the SUS substrate due to different surface morphologies of the sides. The PNGs on the SUS substrates showed typical piezoelectric output performance. The voltage output from the PNGs on the double-sided SUS substrate was much larger than that of the PNGs on the front side or back side of the SUS substrate.

In particular, the PNG on the double-sided SUS substrate showed a 1.12 to 1.66 times larger voltage output compared to the sum of the voltage output from PNGs on both sides of the substrate. This abnormal enhancement of voltage output is due to the electric field-induced synergetic effect between two front side and back side PNGs and to the

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