

## Supplementary Material

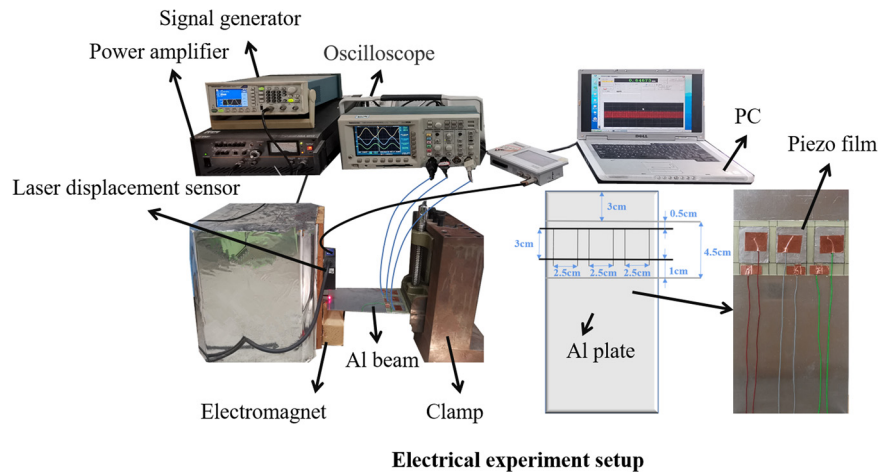
Three piezoelectric films prepared under the same condition are bonded on an Al plate by epoxy resin. One end of the Al plate is fixed on the steel base as showed in Figure 3/ Figure S1. A magnet is bonded on the other end, an electromagnet coil is put under the magnet.

In the test, a sinusoid voltage (25 Hz, close to the resonant frequency of the structure) from the signal generator is amplified by a power amplifier and works on the electromagnet coil. The induced magnetic field forces the end of the plate to vibrate periodically, leading to the periodical deformation of piezoelectric films, thus voltages are generated. The output voltages are recorded by the oscilloscope. The displacement of the end of the

Al plate (near 1 mm) is measured by a laser displacement sensor. As the open circuit voltage is proportional to the film thickness and the end displacement, thus the calibrated open circuit voltage is calculated by the following equation to evaluate the piezoelectricity:

$$V_c = V \frac{u_0 t_0}{ut}$$

where  $V$  is the measured voltage,  $u$  is the displacement of the end of the Al plate,  $t$  is the film thickness,  $u_0 = 1.0$  mm is the standard displacement, and  $t_0 = 100.0 \mu\text{m}$  is the standard thickness.



**Figure S1:** Measurement setup of the open circuit voltage.