## Fundamentals of multiferroic materials and their applications in magnetic sensors

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## Abstract:

Magnetic and ferroelectric ordering coexistence in multiferroics has drawn many exciting effects. This work reviews our recent progress in multiferroics and widerange magnetic sensor applications. Here, the magnetoelectric (ME) composites were prepared in the laminate types generated by inserting a leadzirconate titanate PZT plate between sheets of highly soft magnetic thin film or ribbon. By optimizing material constituents, geometries, dimensions, and array connection, a substantial magnetoelectric effect with an incredibly high output voltage response to a low magnetic field of 630 V/cm.Oe has were achieved. These simple, fast, cost-effective fabrication sensors, however, offer suitable sensitivity, accuracy, and resolution to act in the range of nanoTesla. Thus, numerous sensing applications were developed, such as spatial angular positioning devices, 3-D magnetometers, novel electronic compasses, current sensors, non-destructive flux leakage testing, and Chinese medical applications.