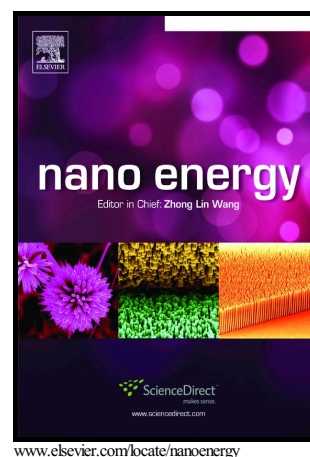


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Piezoelectric and Pyroelectric Properties of Intrinsic GaN Nanowires and Nanotubes: Size and Shape Effects

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Abstract:

Gallium nitride (GaN) nanowires and nanotubes possess extraordinary device ability of converting wasted energy into harvestable electricity in terms of their piezoelectricity and pyroelectricity. From the perspective of atomic cohesive energy, we present a model to clarify the physical origin of the size- and shape-dependency of the piezoelectric and pyroelectric properties for intrinsic GaN nanowires and nanotubes. It is shown that both the piezopotential and the pyropotential increase with the inverse of GaN nanocrystal size or with the shape factor. The influence of size and shape becomes more significant for nanotubes with smaller size or wall thick-to-size ratio and may enhance both potentials by up to dozens of times or even more. Such

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