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Abstract for an Invited Paper
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Enhanced magnetoelectric effects via strain engineering and structural softness[1]

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After describing a general theory of the magnetoelectric response, I will argue that inducing *structural softness* – i.e., tuning a material so that it takes a small amount of energy to distort its structure – constitutes a general and robust strategy to obtain very large effects. Further, I will argue that this design strategy will be effective at room temperature, and will not affect other desirable properties of the materials (i.e., their insulating character). I will illustrate this possibility with first-principles results for thin films of room-temperature multiferroic $BiFeO_3$, where the structural softness is induced by epitaxial strain. I will also present results for $BiFeO_3$-based solid solutions, discussing several alternative mechanisms by which their electromechanical and magnetoelectric responses can be enhanced. Finally, I will discuss the prospect of inducing in $BiFeO_3$ a so-called *morphotropic phase boundary*, where the material is expected to display very large functional responses in analogy to what occurs in strong piezoelectric $PbZr_{1-x}Ti_xO_3$.

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