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## A possible path to design higher temperature superconductors

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Design of new materials with tailored properties requires detailed structural information in real and reciprocal spaces. Our recently published THz synchrotron experiments have provided evidence for the key role of bonding symmetry on superconductivity of MgB<sub>2</sub> compounds. Another group of recent experiments has shown that external electric fields can control the superconducting transition temperature, via piezoelectric related phenomena according to DFT predictions. Further analyses of these results indicate that electric fields generated with small voltages induce structural and electron population effects, which resemble and are equivalent to those of very high pressures (in the tens of GPa's). Given that the recently discovered families of room temperature superconductors require very high pressure (in the hundreds of GPa's), our results suggest that electric fields of appropriate magnitude and symmetry may induce the correct conditions for higher temperature superconductivity, with more easily achievable means. The experimental evidence, calculation results and evolution of ideas will be discussed.

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