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**Tailoring of materials properties under extreme conditions<sup>1</sup>**

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Materials can be driven far from equilibrium e. g. with intense pulses of lasers and ions, in mostly destructive processes. When combined with micro- and nano-structuring, the ability to rapidly excite and then quench local excitations opens up. Now opportunities emerge to form and stabilize novel materials phases and to tailor materials properties for applications. Examples are color centers in diamond and silicon carbide for sensing and qubit applications and proposed ordered dopant structures in cuprate superconductors. Results from studies of materials processing under transient extreme conditions, far from equilibrium will be presented.

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