

Designing materials at the nanoscale

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Abstract:

We describe challenges and opportunities in condensed matter and materials physics applied to information and communication, lighting and energy technologies. We show how materials designed at the nanoscale address some of these challenges. These include quantum circuits based on electron spin, synthetic quantum systems hosting macroscopic quantum states, quantum dots in topological insulators, semiconductor nanocrystals, graphene quantum dots and 2D materials hosting valley polarized electron gas.