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BORON CLUSTER BUILDING BLOCKS FOR HYBRID MATERIALS

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Our work is devoted towards examining several basic concepts related to the functionalization of polyhedral boron-rich clusters and their use as building blocks to create hybrid materials with unprecedented structural features and unmatched properties. These clusters are particularly interesting since they can be regarded as three-dimensional (3D) analogs of benzene. The unique chemical and physical properties of these species such as rigidity, inertness, and 3D aromaticity, allows one to access a set of properties not normally available in carbon-based chemistry. Over the past several years we have demonstrated how these clusters can be used to create a new class of organic light emitting diode materials, extremely powerful photo-oxidant reagents for polymerization and doping, unique building blocks for stabilization of surfaces and atomically-precise nanoparticle surrogates featuring improved stabilities in biological media. My presentation will focus on several of these recent developments highlighting new directions for these clusters and potential applications in materials science.