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Abstract for an Invited Paper  
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### **Symmetry Protected Topological Insulators and Semimetals**

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We will discuss recent developments in topological band theory, in which the combination of time reversal symmetry and crystal symmetries lead to novel insulating and semimetallic states. After introducing the interplay between symmetry and topology in the electronic structure of crystalline materials, we will discuss several examples of protected metallic states that can occur on the surface and in the bulk. These include Dirac semimetals in two and three dimensions, double Dirac semimetals and line node semimetals as well as new classes of topological crystalline insulators with surface states that violate symmetry enhanced doubling theorems. We will contrast semimetallic behavior that arises due to band inversion with filling enforced semimetals that arise due to the existence of non-symmorphic space group symmetries.