Topological insulators are new materials observed in nature that can be characterized by a $\mathbb{Z}/2$-valued invariant. This topological $\mathbb{Z}/2$ invariant can be understood as a mod 2 index theorem in KR-theory. I will give some background and talk about the relevant index theory and K-theory. Besides the topological $\mathbb{Z}/2$ invariant, the bulk-boundary correspondence is also an active research topic in KK-theory. (Received September 17, 2017)