# TOPCon Crystalline Si Solar Cell Technologies and Beyond

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## Summary:

Passivating contacts based on poly-Si/SiOx stacks also referred to as TOPCon (tunnel oxide passivated contacts) have substantially improved the performance of crystalline silicon (c-Si) solar cells in recent years. Efficiencies above 26% have already been reported. Further improvements in TOPCon solar technologies are being extensively studied in many research laboratories and companies. For example, TOPCon technology advancements may involve replacing locally diffused boron regions with local p+ poly- Si/SiOx under metal contacts to mitigate recombination losses on the front side. Similarly, studies focusing on introducing full-area TOPCon structures on the front side for next-generation solar cell technology have been reported. Several issues like advanced hydrogenation, metallization, and UV degradation have been the main focus of research in recent years.

In this talk, the fundamentals of TOPCon solar cell technology, possible technological improvements, and activities at GÜNAM on this technology will be summarized. In particular, an introduction of local TOPCon structure, and a new TOPCon-like bottom cell structure for tandem applications will be presented. Also, a summary of Turkish PV eco-system and research and development studies at the Center for Solar Energy Research and Applications (ODTU-GUNAM) will be given very briefly.