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# VBTI Aging: Yet Another Critical Design Challenge for Microring Resonator Based Silicon Photonic Interconnects

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## Abstract

Silicon photonic interconnects can enable higher bandwidth and lower latency data transfers at the speed of light. Such photonic interconnects consist of photonic waveguides with dense-wavelength-division-multiplexing (DWDM) for signal traversal and microring resonators (MRs) for signal modulation and reception. To enable MRs to modulate and receive DWDM photonic signals, change in the free-carrier concentration in or operating temperature of MRs through their voltage biasing is essential. But long-term operation of MRs with constant or time-varying temperature and voltage biasing causes aging. Such voltage bias and temperature induced (VBTI) aging in MRs leads to resonance wavelength drifts and Q-factor degradation, which increases signal power penalty and energy delay product in photonic interconnects. To be able to counter the severe effects of VBTI aging in MRs presents yet another critical design challenge for MR based photonic interconnects. In this talk, we will explore VBTI aging in MRs and demonstrate its impacts on on-chip photonic interconnect architectures.

## Bio

Ishan Thakkar is currently a PhD candidate at Colorado State University (CSU), Fort Collins, CO, USA. He received his MS degree in electrical engineering from Colorado State University (CSU), Fort Collins, CO, USA. His current research interests include silicon photonics, photonic networks-on-chip, high-speed optical interfaces, DRAM architectures, and non-volatile memories. He is the recipient of the best paper award from IEEE/ACM SLIP 2016 workshop, a best paper nomination from the IEEE ISQED 2016 conference, and a best paper nomination from the TMSCS journal in 2017 for his research contributions.