

# BWRC Seminar Friday, February 2nd at 12:30 pm in the Forum

## **The Race to Replace Quartz**

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### **Abstract**

It is well-known that cost and performance have driven the demand for integration in the semiconductor industry since its inception. Nevertheless, several components of typical electronic systems remain in discrete form because it is difficult to develop these components in a circuit fabrication technology, such as CMOS, while also achieving adequate performance. Components of particular interest are quartz frequency references for timing and carrier synthesis. This seminar will focus on this "race" to replace quartz by first motivating the endeavor and then analyzing viable replacement technologies from a qualitative and quantitative point of view while discussing current progress and scalability. In particular, recent commercialization efforts of MEMS microresonators out of Michigan, Stanford and Berkeley will be presented along with progress made in improving ceramic resonator performance. It will be shown that though these efforts and results are significant, they have all overlooked the viability of CMOS and precision RF/analog circuit design as a viable technology capable of replacing quartz. The remainder of the seminar will focus on radio frequency temperature compensated harmonic oscillator (RF-TCHO™) technology. Ultimately an argument will be presented that quartz is very likely to be replaced in electronic platforms on a large scale and in the near term.

Dr. Michael S. McCorquodale received the B.S.E. degree with honors in EE from University of Illinois at Urbana-Champaign in 1997, the M.S.E. degree with honors in EE and the Ph.D. degree in EE from the University of Michigan in 2000 and 2004 respectively. In 2004 he founded Mobius Microsystems where he serves as the CTO and a member of the Board of Directors. He is also an adjunct lecturer at the University of Michigan in the Department of Electrical Engineering and Computer Science.