

Bio -- Bret Chisholm



Bret received his BS degree in Chemistry with emphasis on Polymers and Coatings from North Dakota State University in 1989 and his PhD in Polymer Science in 1993 from The University of Southern Mississippi. After graduation, Bret was employed by the General Electric Company for 11 years. Bret led research programs in the area of organic coatings at the GE's Corporate Research Center in Schenectady, New York. In 2004, he joined The Center for Nanoscale Science and Engineering at North Dakota State University and is currently the director of the Combinatorial Materials Research Laboratory. Bret is also an Adjunct Professor in the Department of Coatings and Polymeric Materials. He is the author of over 100 publications and an inventor on 25 US patents.

The Development Contact-Active Antimicrobial Polysiloxane Coatings

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Combinatorial/high-throughput methods involving a suite of biological assays were used to generate extensive structure – antimicrobial relationships for a novel class of polysiloxane-based antimicrobial coatings. As shown in Figure 1, the compositional space explored consists of moisture-curable polysiloxanes containing tethered quaternary ammonium salt (QAS) moieties. All compositional variables, which include silanol-terminated PDMS molecular weight, QAS alkyl chain length (R_1 in Figure 1), spacer length (R_2 in Figure 1), and counterion composition (X in Figure 1), were investigated resulting in the synthesis and antimicrobial characterization of approximately 160 unique compositions. The results of the study showed that antimicrobial activity was highly dependent on QAS alkyl chain length (R_1 in Figure 1) and spacer length (R_2 in Figure 1). Due to the extensive structure – antimicrobial activity relationships derived from the study, optimized coating compositions were readily identified and used to produce coated urinary catheters that exhibited broad spectrum, antimicrobial activity.

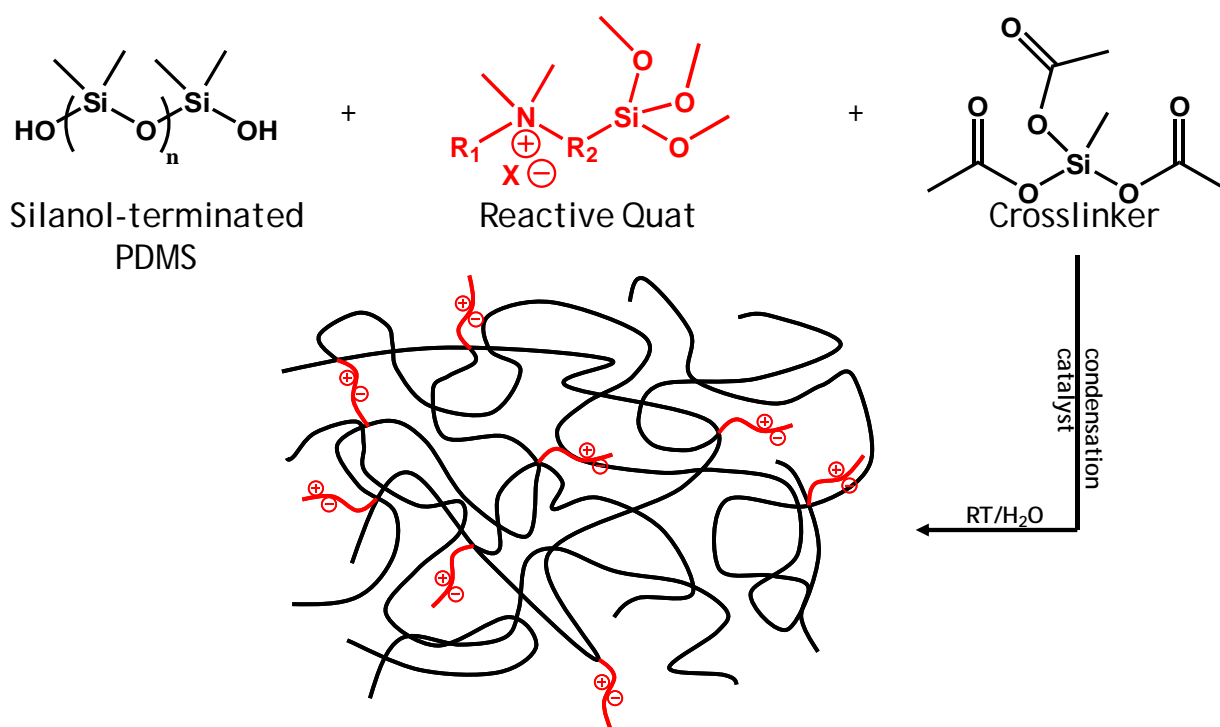


Figure 1. An illustration of the compositional space investigated using combinatorial/high-throughput methods.