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Structurally Controlled Carboxy-Functionalized Silsesquioxanes for Antifogging Hard Coatings

Structurally controlled polysiloxanes have attracted considerable attention, particularly in the field of materials science, due to their excellent thermal and chemical stability derived from siloxane bonds, high solubility achieved through precise molecular design, and structural diversity. Our group has developed synthetic methods for various siloxane compounds, including ladder-like polysilsesquioxanes (SQs) bearing ionic side chains, polyhedral oligomeric silsesquioxanes (POSS), and stereochemically defined cyclic siloxanes with uniform structures.[1–3]

In this presentation, we focus on antifogging hard coatings derived from structurally controlled carboxy-functionalized SQs. We previously reported the synthesis of soluble carboxy-functionalized POSS (POSS-C, Figure 1a)[4] and polySQ (PSQ-2C, Figure 1b).[5] Recently, we discovered that coatings formed by thermally treating these carboxy-functionalized SQs with oligo(ethylene glycol) (OEG, Figure 1c) exhibit excellent antifogging properties along with high surface hardness.[6,7] The preparation methods and characteristics of these coatings will be discussed.

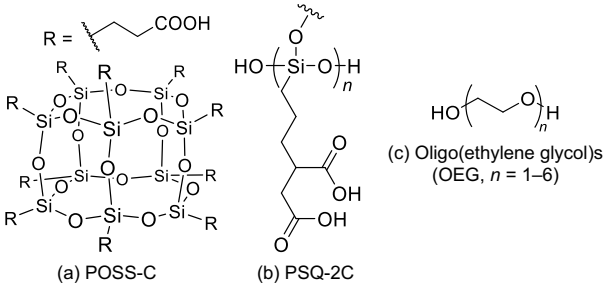

Figure 1. Structures of (a) POSS-C, (b) PSQ-2C, and (c) oligo(ethylene glycol)s.

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