
# Preparation of Polysilsesquioxane-based Antifogging Materials

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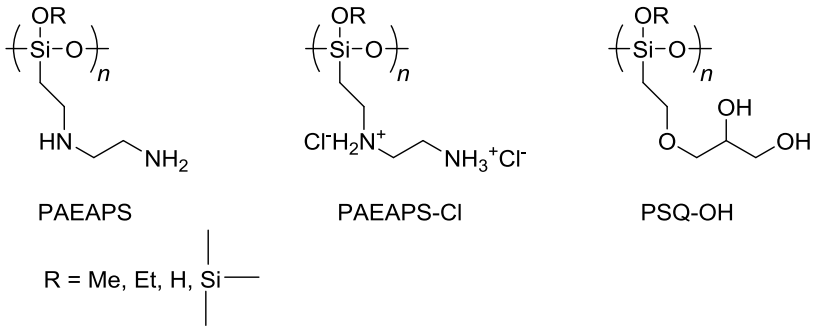
Antifogging materials are of current interest because of the increased demands to prevent the fogging on the surface of glasses, optical lends, mirrors, etc. To date, hydrophilic polymers that contain hydrophilic units such as hydroxy, amino, carboxylic acid, and ionic group have been studied as antifogging materials. Examples include poly(acrylic acid), poly(vinyl alcohol), and poly(ethylene glycol) that effectively absorb water by the formation of hydrogen bonding with water molecules to prevent the formation of water droplets on the surface. However, when the antifogging materials are applied under the severe conditions such as for coating the vehicle windshield, the antifogging material should also possess the surface hardness because the scratches readily decrease the transparency of the coated glasses. Therefore, there is a serious problem for the application of the hydrophilic polymer to antifogging materials, as typical hydrophilic polymer films usually exhibit poor scratch resistance.

Polysilsesquioxanes (PSQ) that have high thermal stability and mechanical property arising from the Si–O–Si network have been extensively studied as typical organic-inorganic hybrid materials. Recently, we have reported the preparation and antifogging properties of PSQ-based hydrophilic polymers, such as poly(3-(2-aminoethylaminopropyl)silsesquioxane) (PAEAPS) [1] and its ammonium salt polymer (PAEAPS-Cl) obtained by treatment of PAEAPS with hydrochloric acid [2], and poly(3-(2,3-dihydroxypropoxypropyl)silsesquioxane) (PSQ-OH) [3, 4]. These PSQ films absorb water by the hydrogen bonding between the hydrophilic groups (amine, ammonium, and hydroxy groups) and the water molecules and the Si-O-Si network provides the mechanical stability. As a result, these PSQ-based polymer films exhibit high water uptake and scratch resistance. PSQ-based antifogging materials seem to be useful as alternatives of the traditional organic polymer-based antifogging materials.




## References

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