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## Anti-Fogging and Anti-Frosting Behaviors of Layer-by-Layer Assembled Cellulose Derivative Thin Film

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### Abstract

Two cellulose derivatives, quaternized cellulose (QC) and carboxymethyl cellulose (CMC), were layer-by-layer (LbL) assembled to prepare a thin film. QC was also LbL assembled with two synthetic polyelectrolytes, poly(acrylic acid) (PAA) and poly(styrene sulfonate) (PSS), separately. The anti-fogging and anti-frosting properties of the assembled films were studied. QC/CMC thin film exhibits anti-fogging and anti-frosting behaviors, whereas QC/PAA and QC/PSS films do not have capacity for anti-fogging and anti-frosting. The anti-fogging and anti-frosting properties of QC/CMC film are attributed to that water molecules can be quickly adsorbed into the matrix of the film. The water adsorption of QC/CMC film was illustrated by the optical thickness increment.

**Key Words:** Anti-fogging, Anti-frosting, Layer-by-Layer Assembly, Polysaccharides, Cellulose Derivatives

### Introduction

Fogging and frosting are that water vapor condenses on solid surface to form water droplets and ice particles, respectively (1-3). Fogging and frosting make serious problems for vehicle windows, air conditioners, power transmission lines, refrigerators and aircrafts. Many efforts have been done to alleviate fogging and frosting. In some areas, electro-thermal devices is utilized to avoid fogging and

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