### 6. Title and Subtitle

Hydrophobic Treatment of Glass Headlamp Lenses and the Effect on Light Output

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### 8. Abstract

This study examined the effect that hydrophobic treatment of glass headlamp lenses has on light output when headlamps are exposed to contaminants under naturalistic driving conditions. The hypothesis, *a priori*, was that the water-repelling nature of a glass surface after hydrophobic treatment would aid in minimizing the adhesion, or promote the removal, of contaminants on the lens, thereby leaving light output less affected.

Additional variables of interest included the presence of precipitation, the side of the vehicle the headlamp was on, and whether the headlamp was illuminated during the exposure. The study examined vehicles with glass lenses installed as intended by the vehicle manufacturer. The vehicles were driven on a 155-km route under conditions of active precipitation or no precipitation, and with or without the headlamps on. Subsequent to each drive, measurements of light output were made at eight key test points in the headlamp beam pattern. The headlamps were then cleaned and measured again. In this way, each headlamp served as its own control.

The results indicate that hydrophobic treatment of glass headlamp lenses did not affect light output. However, the presence of precipitation did result in decreased light output below the horizontal cutoff of the beam pattern and increased light output above the horizontal cutoff. This result was especially evident above the horizontal cutoff when the headlamps had been illuminated. The side of the vehicle the headlamp was on did not affect light output.

### 15. Key Words

beam pattern, dirt, glare, headlamp, hydrophobic, rain