Boosting LiDAR performance through better stray light control using Vantablack coatings

EPIC Meeting on LIDAR Technologies for Automotive 2019
Vantablack®

World’s leading range of super-black coatings created using advanced nanotechnology
How Vantablack works

- Low-density microstructure with ultra-low reflectance across wide spectral range
- Multiple absorbing elements and optical cavities
- Open structure with micro surface roughness maintains low reflectance viewed from virtually any angle
- Multiple “point” attachments provide extreme thermal and mechanical resilience
- Post etched for optimal performance
Ultra-low Reflectance

• Uniquely combines ultra-low BRDF and specular reflectance characteristics
• Featureless characteristic across spectrum from UV – FIR and beyond
• Suppresses stray light – minimum optical baffling
• Retrofit solution
Mechanical Stability

- Excellent shock and vibration resistance
- No particle fallout
- Compatible with commonly-used plastics / metallic substrates
Environmental Stability

- Stable in extreme environments
  - achieved space heritage
  - withstands extremes of temperature
- Does not contribute to fogging (SAE 1756J, ASTM 595, ECSS)
- Super-hydrophobic
Vantablack Automotive Applications

- Head Up Display
- Camera Lens
- Camera Glare Shield
- Headlamp
- Tail Light
- LiDAR Sensor
## Blickfeld Solid State MEMS LiDAR

### Achievable Key Performance Metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field of view</td>
<td>120° x 30°</td>
</tr>
<tr>
<td>Detection range</td>
<td>&gt; 200 m range</td>
</tr>
<tr>
<td>Scan lines</td>
<td>8 – 200</td>
</tr>
<tr>
<td>Frame rate</td>
<td>4 – 100 Hz</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1°</td>
</tr>
<tr>
<td>Data Points</td>
<td>&gt; 1,000,000/s</td>
</tr>
</tbody>
</table>

Blickfeld Cube
Blickfeld Approach – Daylight Suppression by Spatial Filtering
Blickfeld Approach – Daylight Suppression with Vantablack
Blickfeld Approach – Vantablack vs. Standard Module

- Improved straylight suppression in a wide angular space in the Vantablack coated detector housing
- This results in an improved LiDAR performance under daylight conditions
- Higher S/N ratio leads to increased detection range and better recognition of low reflective objects
Blickfeld Approach – Safer System
What’s hidden?
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