Energy efficient SPD-SMARTGLASS is the world’s highest-performing “dynamic” glazing. It regulates the amount of light, glare and heat transmitted through windows and other products. Developed by Research Frontiers Inc., SPD-SMARTGLASS uses light-control film produced by Hitachi Chemical Co., Ltd. and Isoclima S.p.A – Finind Group.

SPD-SMARTGLASS is now offered globally through licensed suppliers and their partners for automotive, marine, aerospace, commercial and residential projects. SPD-SMART™ automotive windows are available in standard and custom configurations for OEM and aftermarket vehicles.

**HOW IT WORKS**

SPD-SMART film contains microscopic particles. Regulating the voltage to the film adjusts the particles’ orientation, instantly and precisely controlling the passage of light, glare and heat through the film. SPD-SMART film is laminated between panes of glass or plastic substrates. Fabricated SPD-SMART insulated automobile windows are exceptionally energy efficient and may be combined with bullet-resident glass.

- Front window visors, sidelites, backlites and sunroofs
- Glass and polycarbonate
- Flat or simple curved surfaces
- Shading, privacy, glare- and heat-control within a single, low-maintenance window
- Eliminated the need for mechanical shades
- Automated and manual controls help optimize energy performance and passenger comfort
- Over 99% of harmful UV radiation blocked
- Laminated IGUs with multi-layer film fabrication significantly reduced adjacent freeway noise
- “The change in light level is very dramatic. We have never seen anything like it.” – Glazing Contractor

Photos above: SPD-SMARTGLASS in dark and clear states at Research Frontiers’ Design Center in Woodbury, NY.
### TECHNICAL DATA

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| Visible Light Transmittance                 | • Unpowered: <1% (Dark)  
• Powered: >50% (Clear)          |
| Contrast Ratio                               | • As high as 170:1                                                      |
| Number of Light-Control Levels              | • Unlimited                                                           |
| Switching Speed                              | • Seconds                                                              |
| Control Over Incoming Solar Energy          | • Solar heat gain coefficient (SHGC) as low as 0.06 (blocks 94% of solar energy)  
• Wide range of control over incoming heat; adaptable to regions and weather conditions |
| UV Protection                                | • Over 99%                                                             |
| Power Consumption                            | • Nominal; As low as 0.06 watts/ft²                                    |
| Width                                        | • 3+ feet (>3+ feet when SPD film is “seamed” within a laminated panel) |
| Length                                       | • No limit; panels up to 9 feet long have been installed              |
| Substrates                                   | • Glass or plastic                                                    |
| Simple Curves                                | • Yes                                                                  |
| Insulated Glass Units, Custom Shapes and Fabrications | • Yes                                                                    |
| Voltage                                      | • AC                                                                   |
| Controllers                                  | • Battery DC to AC  
• OEM and After-Market  
• Manual & Automatic control  
• Variety of window controls  
• Sensors (light, heat, occupancy)  
• Interface with on-board automotive systems |
| Durability                                   | • Tested at millions of on/off switching cycles                        |

### FEATURES:

- Intermediate and fully clear states preserve views and support occupant well-being
- Unpowered dark state reduces interior heat build-up, thus lowering cooling costs
- Exceptional solar energy control manages heat gain and energy used for heating and cooling
- Unpowered dark state efficiently reduces nighttime light pollution
- UV-blocking minimizes degradation of interiors and harmful effects to occupants

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