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Major Advantages:

- An easy and secure installation method designed for ordinary people,
- Solve all major problems, such as electrostatic charge, dust, and air bubbles in installation,
- All common problems are preventable, detectable and resolvable,
- Each step is reversible and repeatable before curing,
- Easy cure with day light
- High quality with a low cost,
- Turn a difficult job into easy work.

Liquid crystal switchable film has been in the market for over two decades. Due to high sensitivity to moisture for older generations of liquid crystal switchable film, glass lamination is a necessary protection for application such as smart glass, switchable window or privacy glass. Laminated switchable glass or "smart glass" was a major application. The third generation, **3G Switchable Film**™, has greatly broadened the fields of applications. A novel non-linear polymer system is successfully used to solve many previous problems including high moisture sensitivity, high haze and chemically instability. In the new polymer system, silicone, fluorine or other elements are introduced to improve moisture resistivity. Silicone and fluorine containing polymers, have great water-proof characteristics, and are used to produce gaskets, cables and non-stick coatings for cookware. With these improvements, **3G Switchable Film**™ is no longer sensitive to moisture and is very durable for use without protection of lamination. **3G Switchable Film**™ can be directly put on a window with optical glue, double sided tape or regular clear tape. Other improvements like low voltage driving, strong UV resistance, front and rear projection screen function and long life time provide a great support for such application. For years, **3G Switchable Film**™ has proven its great durability in labs and fields. Not single edge defect or noticeable change in optical performance has been found or reported over seven years of intensive indoor use without lamination protection. It has been used in many commercial projects worldwide. Overall, users could save two-thirds of their cost by using the new method of installing film on glass. Comparing high energy consumption in glass lamination, it saves energy and is a true low-carbon green application.

A major advantage of gluing liquid crystal film on glass is enhanced optical performance. Each air-film or air-glass interface has some reflection or glare. Gluing **3G Switchable Film**™ on glass will eliminate two of these surfaces. Therefore, 3G Film glued on glass has an optical advantage with less reflection, higher transparency and sharper projection image. Although installing liquid crystal film on a glass can be done by the two older methods, that is, using UV curable glue or using liquid crystal film with self-adhesive, it not only needs special equipments and skills, but also is a very difficult job for ordinary people. Some major problems like electrostatic charge, dust, air bubbles and non-uniformity will always challenge the installation. Mishandling the problems or any mistake will put the installation in a great risk even for professionals, because each of steps of the installation is not reversible and recoverable. The market has an urgent need on a convenient and secure method of installing film on glass; however, it is not easy task for scientists. So far there are not many photo sensitive materials which can be cured by day light. It is also very challenge for UV curable materials to bond both inorganic material like glass and organic material like plastic film and to deliver a great durability. In order to reach a goal of an easy and secure installation by ordinary people, these major obstacles must be overcome. A new installation should be easy in process, simple in tooling and high in successful rate. Now, unique and miraculous glue, called **DayLightCure**™, and a new installation method provides an ideal solution for this industrial field. **DayLightCure**™ is photosensitive polymers based glue having a very low viscosity, which can be cured in any source of day light including office/home florescence light. It has many great features in light initiation, transparency, viscosity, adhesion, reflective index, flexibility of cured polymer, durability and environmental friendliness. Using **DayLightCure**™ can solve all major problems and provide satisfactory results.

The following information will explain how and why installation with **DayLightCure**™ can ingeniously solve all common problems and why it is an easy way for ordinary people to use. The advantages of using this new material and method are:

1. Directly using **DayLightCure**™ in installation avoids a chance to introduce extra haze. Unlike older generations, **3G Switchable Film**™ has ultra clearness, close to the transparency of new car's windshield. Any glue with higher haze is not suitable and qualified to be used on this generation of film and will offset its super clearness. However, in the market, self-adhesives lack the required transparency and successful application cases for optical devices. Major applications of self-adhesives are mainly for non-optical applications, like stamps, stickers and tapes. On the other hand, UV curable glue is usually too difficult to be used for a large area. Warming up thick UV glue to lower

its viscosity is not helpful in obtaining uniformity for a large area. Besides the viscosity and uneven issues, optical glues used in lens system are not ideal to be directly used in bonding film and glass together, because this application requires strong adhesions for both glass (inorganic material) and plastic film (organic material), which is quite challenge for any UV glue. First, bonding conditions and mechanisms are different for inorganic materials and organic materials. Second, it is challenge for cured UV glue to handle different expansion and shrinkage coefficient in temperature change, which often causes delaminating or cracking. Scienstry's **DayLightCure**™ perfectly solves these problems by formulating photosensitive monomers and polymers, normally used for lens system. Many improvements have been made in visible light initiation and curing, lowering viscosity, adhesion promotion, reflective index matching, flexibility control of cured polymer, anti-inflammation, durability and environmental friendliness. Scienstry has twenty years of experience in UV curable manufacture process and this intensive research and development has covered almost all UV curable monomers and oligomers available in the market.

2. Due to requirement of special equipment, ultraviolet curing method is obviously not convenient for non-experienced person to use in normal living condition. This research focused on both curing initiation and stability to achieve a result of easy initiation and a long shelf-time. Easy cure and high stability of uncured glue are two opposite ends which are usually difficult to simultaneously meet. This success becomes one of a few of achievements so far using day light to cure and unique case for large area application. **DayLightCure**™ can be cured by the sunlight, outdoor day light (indirect sunlight) and office/home florescent light. This result provides a great convenience and security to the installation and will be benefit to ordinary people and professionals with great savings in tooling and time.

3. Peeling off a masking sheet from liquid crystal film with self-adhesive always generate electrostatic change on the film. The electrostatic attraction makes the film uncontrollable and has the intention to stick to anything nearby, leading to a wrong positioning. Since the stick is not peelable, the wrong positioning is very dangerous for an installation. Using de-ionized air gun or device is only way to eliminate the electrostatic charge, but may take a long time and introduce dust without a clean room. Since a masking sheet must be used in a liquid crystal film with self-adhesive, electrostatic charge becomes a typical problem for installation of this type film. Using **DayLightCure**™ can easily eliminate the electrostatic charge problem. In this new way of installation, electrostatic charge does not affect a result anymore, because there is no glue between the film and glass, when 3G Film is mounted on glass for positioning. The position of **3G Switchable Film**™ may be adjusted at this time. In fact, when **3G Switchable Film**™ is cleaned with IPA (isopropyl alcohol), electrostatic charge has been discharged. In addition, there are several efficient ways to inspect and solve cleaning issues if needed.

4 Dust-free is a major challenge in any lamination and installation. Once dust is involved in an installation with old methods, there is not an efficient way to repair or recover. Two dust detection methods introduced here may greatly improve this situation. In this new process of installation, after cleaning glass and film with IPA, **3G Switchable Film**™ is simply hung on glass with tape on top edge. Then using a soft rubber roller roll on **3G Switchable Film**™ with gentle pressure. In this way, **3G Switchable Film**™ is perfectly used as a pressure sensitive indication sheet. If there is a dust particle under the film, a bump can be seen on temperately darkened background in the rolling area. Then user may mark this spot and remove the dust late by using tape. Users also can detect dust on clear state of **3G Switchable Film**™. Again, using the roller roll on the **3G Switchable Film**™. If there is no dust under the film, the rolling area will temporally show rainbow, otherwise, a non-rainbow spot will be shown up at the dust area. Here, the feature of low driving voltage (under 36V AC) provides a safe operational condition for installers. Since **3G Switchable Film**™ is simply hanged on the glass at this time, it is easy to lift **3G Switchable Film**™ and to remove dust without any difficulty. Both these methods are very sensitive and capable for detecting any visible size of dust. Since there is no glue on the film, these checking and cleaning processes may be applied as many times as needed until a total satisfactory. The methods provide a great security for cleaning condition.

5. In one old installation, the liquid crystal film with self-adhesive is quite sticky, once the film touches a glass surface; it is very difficult to squeeze air bubbles out or to lift the film to release air bubbles. In another old installation, UV curable glue is used to laminate liquid crystal film; it is difficult to obtain uniform lamination or to squeeze air bubbles out with the thick glue. Therefore, Air bubbles became a serious problem causing a low success rate of the old methods. **DayLightCure**™ solves air bubble problem in a simple way with its very low viscosity like water. After hanging **3G Switchable Film**™ on a glass, the three edges (left, right and bottom) of **3G Switchable Film**™ will be sealed with tape to form a "bag". **DayLightCure**™ can be added from top by a dropper. The glue can automatically drop down and spread at the bottom. The lamination is quite easy by using a roller to roll on **3G Switchable Film**™ from bottom to top. Since **DayLightCure**™ is so thin, air bubbles shown on darker background can be easily seen and squeezed out. Lamination and bubble removing can be performed under either opaque state or clear state of 3G Film. It is a great advantage to check and remove bubbles during this lamination process. After the film completely contacts the glass with the glue, tape on bottom edge is removed. Even without any air bubble, it is necessary to roll over entire area second time to ensure a good flatness and uniformity. The second rolling is from center to opened edges to remove extra glue. This process provides a convenient way to eliminate air bubbles and extra glue, and simultaneously give a great flatness and uniformity.

6. Easy curing is a major advantage of this installation. After laminating **3G Switchable Film**™, the film can be cured automatically at different speed in different lighting condition, from a few of minutes under direct sunlight to a day in total indoor condition. In a case of installation on a window facing to outside, the window should be temperately covered with black plastic sheets (may use a large trash bag) from outside of the window before adding **DayLightCure**™, so that user can create a long working time. In general, no special care is needed during the curing period. Exposure to day light is only requirement to cure the glue. Two wires can be soldered to electrodes on the film. Of course, **DayLightCure**™ can also be cured by UV light with a few minutes; it may be helpful to speed up an indoor installation project for a professional installer.

7. It is an obvious characteristic that the entire process of installation is easy and secure. All common problems are preventable, detectable and resolvable. Electrostatic charge does not affect the result anymore. Dust is detectable and removable. Air bubbles are preventable and removable. There are no special needs for curing except day light. The method easily delivers a good flatness and uniformity. Each step is reversible and repeatable before curing. Even after applying the glue but before curing, the film can be peeled off from a glass easily, because uncured **DayLightCure**™ is not sticky (many other glues are very sticky to hands and gloves), and the film can be cleaned up with isopropyl alcohol for reuse. There is no special requirement for tooling and skill to use this new method. It is easy for ordinary people to get satisfactory result. This method delivers a high quality installation with great savings in tooling, energy, time, and cost. These advantages of very low viscosity, super transparency and easy cure can be utilized to repair delamination, to make laminated glass/polycarbonate panels with resin casting process and to laminate other films for windows of cars and buildings.

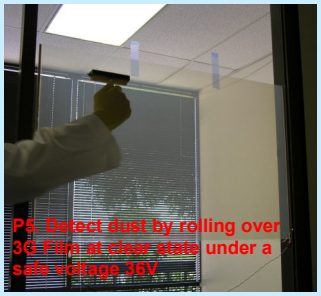
Appendix A
Picture Illustration of Installing 3G Switchable Film on An Existing Glass
Indoor Application


P1. Tools and Materials
Scraper, Gloves, Napkins (or clean room wipers)
Isopropyl Alcohol IPA (70% to 99%)
Clear Tape (or other color tapes)
DayLightCure glue, Dropper, Soft Rubber Roller


P2. Clean glass with a scraper and IPA


P3. Hang 3G Film on glass


P4. Detect dust by rolling over 3G Film at opaque state


P5. Detect dust by rolling over 3G Film at clear state under a safe voltage 36V

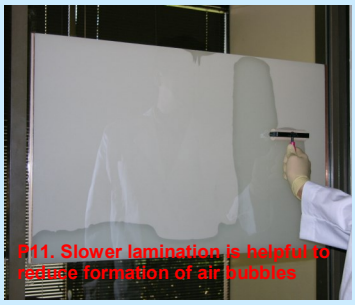

P6. Remove dust by tape at clear state under safe voltage

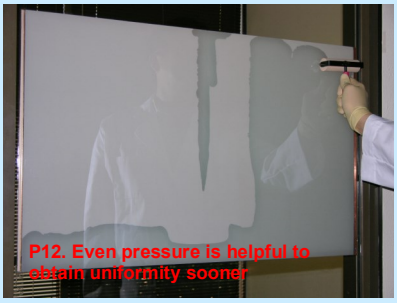

P7. Seal left, right and bottom three edges with clear tape

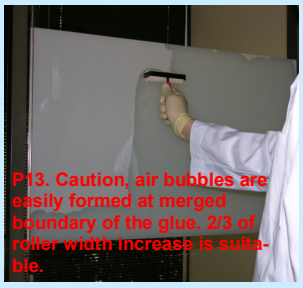

P8. Add DayLightCure with a dropper


P9. DayLightCure automatically spreads at bottom

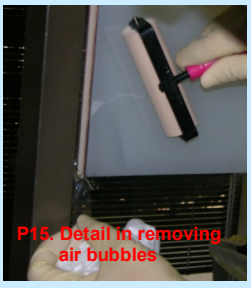

P10. Begin to laminate from bottom


P11. Slower lamination is helpful to reduce formation of air bubbles


P12. Even pressure is helpful to obtain uniformity sooner


P13. Caution, air bubbles are easily formed at merged boundary of the glue. 2/3 of roller width increase is suitable.

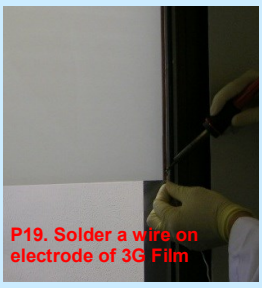

P14. All bubbles can be squeezed out from both top and bottom


P15. Detail in removing air bubbles

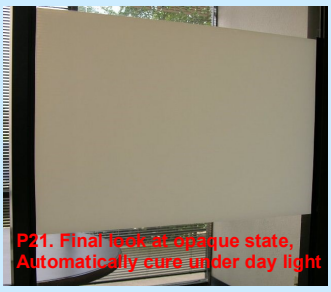

P16. Clean up with IPA after removing bubbles


P17. Second rolling over for ensure a good flatness and uniformity


P18. Final clean up with IPA


P19. Solder a wire on electrode of 3G Film


P20. Cover the electrodes with black tape


P21. Final look at opaque state, Automatically cure under day light


P22. Final look at clear state. 3G Film works during curing.

Appendix B
Picture Illustration of Installing 3G Switchable Film on An Existing Glass
Application of A Large Window Facing Street

P1. Tools and Materials
Scraper, Gloves, Napkins (or clean room wipers)
Isopropyl Alcohol IPA (70% to 99%)
Clear Tape (or other color tapes)
DayLightCure Glue, Dropper, Soft Rubber Roller

P2. Cover a window facing north with a black plastic sheet from outside

P3. Hang 3G Film on inside of the window

P4. Detect dust by rolling over 3G Film. Dust bumps can be seen on rolling trace

P5. Rolling detection is sensitive for any visible sizes of dust

P6. It is easy to remove dust by lifting 3G Film and by tape

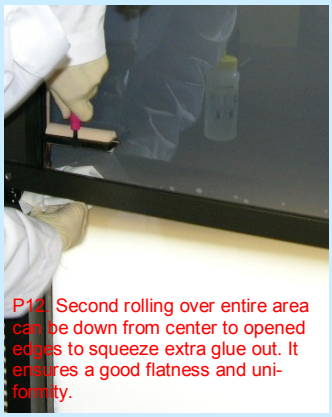
P7. Seal left, right and bottom edges with tape

P8. Add Day-LightCure

P9. DayLightCure automatically drop down to bottom

P10. Laminating 3G Film by rolling from bottom to top

P11. Slower lamination can reduce air bubble formation



P12. Second rolling over entire area can be down from center to opened edges to squeeze extra glue out. It ensures a good flatness and uniformity.

P13. Simply use magnetic buttons to fix or prevent small non-flatness area before curing

P14. Clean up with soft napkins and IPA

P15. Final look at opaque state. Easy cure in about two hours under this day light condition

P16. Final look at clear state. 3G Film works during curing