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MyrR

Smart Dielectric Mirror Design

The MyrR smart mirror is a design based on the use of Dielectric glass that is used mainly in the smart display and TV industry. Based on [1], the dielectric mirror is a semi-transparent mirror coating that is placed on glass. The coating allows the glass to become a mirror in favorable lighting conditions. There are many other “two-way” mirror options in the industry, but this seems to be the most widely used and most favorable glass/mirror option for the highest quality display. The project using this mirror is one that is mainly used as a bathroom reflective mirror, but will act as a “two-way” display and reflective option to display customer decided objects such as a calendar, weather and music choice for example.

Based on the RP Photonics Encyclopedia [2], a dielectric mirror is a mirror designed with multiple thin layers that have different transparent optical make-ups. The uses of dielectric mirror design can aid in the make-up of broader reflection bandwidth, special polarizing properties, edge filters such as long-pass and high-pass filters, and dispersive mirrors. The resonator mirrors of laser are mainly implementing dielectric mirrors in today’s laser production. The growing use of dielectric mirrors is very evident as they are making their way into the laser industry which is a very growing and successful growing industry.

As mentioned, TV mirror applications are some of the new uses for dielectric mirrors. As the use of home automation products and other wireless home devices such as ‘Alexa”, the dielectric mirror is making its way into the everyday home. It allows for the complete hiding of television screen or other screen that is not wanted to be viewed 100% of the time. Just as this project is making evident, the dielectric mirror is allowing for many different in-house smart mirror solutions.

Also known as semitransparent mirrors (DM), the applications of dielectric mirrors allow for many new and upcoming applications in the industry. Motion sensors are placed behind the mirror as well as the implementation of touch panels. Hotels are also incorporating “invisible tvs” in rooms for the most efficient use of wall space [3]. Many companies like Evaporated Coatings, manufactures highly reflective low loss laser dielectric mirror coatings that allow for the creation of extremely dense films. These films allow for stable performance under different temperature and humidity conditions. This proves very influential for the applications of lasers and their performance. It also allows for little to no spectral shifts due to reduced coating sensitivity and high humidity and varying temperature conditions [4].

It was the technology evolution for small size diode lasers that created the demand for dielectric narrow band stop filter [5]. After implementing the thin film coating, the multilayer dielectric coating techniques give the ability to aim the laser in the form of a perfect red dot and not the old-style reticle. To achieve the faster acquisition reticles such as crosshairs or circles used in shooting sights, a more complex aberration free optics must be used.

Moving away from lasers, there are many different types of dielectric mirrors. From the product following product list [6], there are many options as far as what applications the mirror is being used for, what room it would be placed in, and the size. Guardian glass offers two different light reflection/light transmission options in their mirrors. The DM 60/40 reflects nearly 60% of light while transmitting 40%. This allows the display to become clearly visible when it is turned on and it is also the most popularly used when the mirror function is still very much the main aspect of the design. The later option obviously reflects approx. 30% of light and transmits around 70% but is mainly used when the display basically equal to the mirror size, acting as more of a glass cover rather than a reflective surface. Guardian glass also offers that their glass solutions can be annealed, enameled, heat soaked, heat strengthened, laminated, painted and toughened. Multiple options in thickness and cut sizes is also an option. This reveals that the dielectric glass/mirror is a very useful product in the market and is sold enough for in home applications to be an “off-the-shelf” solution. As for the project this is going to be used for, it is very clear that a dielectric mirror will be very easily accessible for purchase and shipping.

The dielectric mirror will be what is seen the most in this project. It seems as though it will be very beneficial in allowing for both the viewing of oneself (reflection) and the viewing of a display. The idea is for only a portion of the mirror to be part of the display so as to prevent the user from not being able to see their reflection at the same time as viewing the desired display. Based off of the applicational uses of the mirror, it will be the best solution found to allow for a clear display/reflection component that is crucial in the final design.

Another option for the dielectric mirror is to allow for it to be fog-proof. That would be another purchasable item is looking for the right dielectric mirror. The reason for providing a fog proof mirror would be for the at-home final product mirror. While we may not need a fog-proof solution for the iteration we make, it would be very beneficial for the end-user to see such a thing working in harmony with all of the other design components in the project. By providing a mirror solution that gives a clear reflection, a very clear display screen, and a fog free option, the mirror would be a very strong component for the team MyrR smart mirror design project.

References

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