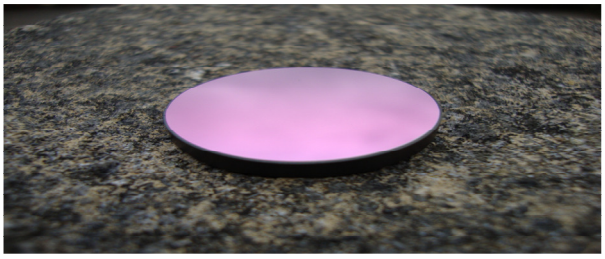
Brinell Vision
Thin Film Technology

Brinell HD

High Durability coating process for harsh environments



The Brinell HD process has been developed to provide a high quality, durable broadband anti-reflection (HDAR) or optical filter coatings onto glass and plastic substrate for use in harsh environments. The process utilises advanced plasma thin film deposition to allow all types of substrates and levels of surface finish to be coated to an outstanding quality. The adhesion primer layer prepares the uncoated lens for deposition of high quality dense thin films and an optional oleophobic top coat increases the resistance to chemical and mechanical damage.

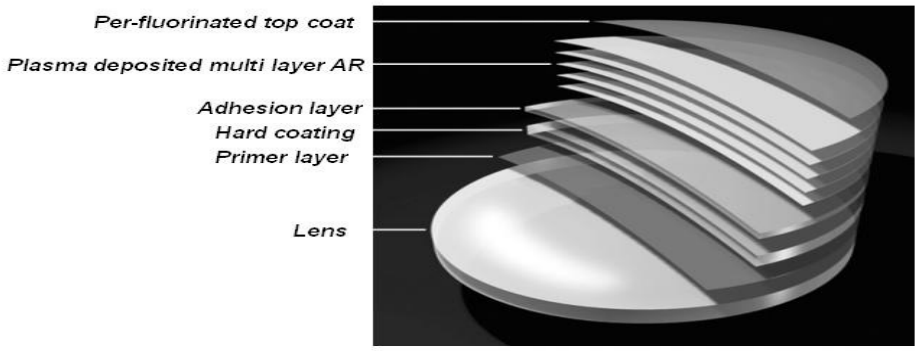


Fig 1.

Advanced plasma deposition of AR stack

Lower temperature coating is becoming important as lens materials become more sophisticated and sensitive to processing.

Brinell HD utilises low temperature, high-powered plasma during deposition of carefully selected dielectric materials. The plasma source adds energy to the process without adding heat or thermal stress to the lens. The plasma energy added is equivalent to heating the substrate to over 400^{o}C; such temperatures are quite clearly not suitable for some sensitive substrates such as filter glass and plastics.

The result of the plasma process is the production of dense, smooth films, which exhibit excellent optical properties. These superior film properties, such as lower scattering, lower adsorption and higher refractive index lead to excellent transmission and clarity.

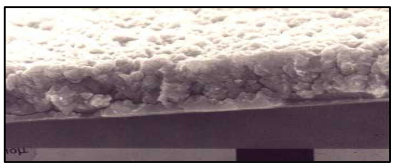


Fig 2. Standard thin film coating

Fig 3. Plasma assisted coating

SEM Picture (thickness approximately 200nm)

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Advanced oleophobic top-coat chemistry.

The plasma assisted thin film coating exhibits a very smooth dense surface structure when compared with standard commercially available coatings (see Fig 2 & 3). This smooth film combined with ***advanced oleophobic*** top coat makes lenses and filters much easier to clean and look after without the addition of light scatter at the interface between the AR stack and top coat.

The top-coat chemistry is created by an accurately controlled vapour deposition process of per-fluorinated-polymer molecules. Unlike standard top coats these PFA-POSS molecules possess free radicals, which form covalent bonds with the top layer of the coating stack.

This highly stable reaction reduces the contact area of water and grease droplets (see Fig 6, 7 & 8). The outstanding hydrophobic and oleophobic properties make the lens easier to clean due to its rejection of water and grease.

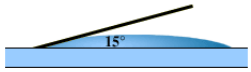

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Fig 6. Contact angle for AR coated lens without top coat

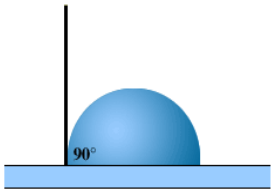

Fig 7. Contact angle of AR coated lens with standard top coat

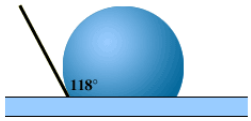

Fig 8. Contact angle for **Brinell HD** oleophobic top-coat chemistry

Durability

The top-coat chemically reacts with the final layer of the AR coating stack and exhibits no clear physical interface. This ensures that the coating remains on the lens, cannot be easily removed and provides additional protection against chemicals and reduction in friction/general abrasion.

Fig 9. Standard top coat contact angle after stroke test

Fig 10. **Brinell HD** top coat contact angle after stroke test

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