Ultimate Protection of Your Visual Comfort and Investment – Premium Anti-Reflective Treatment

Product Spotlight – HOYA EX3+

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Ophthalmic Level 2 – 1 Hour ABO Credit

Course Description:

In this course, we will review the patient and practice benefits afforded by recommending premium AR treatment for every pair of lenses sold. We will review the technology behind premium AR that makes it easier to clean, more durable, more protective, and cosmetically appealing. And we will introduce HOYA EX3+ AR to protect the eye from UV reflected from the back surface of the lens as well as UV transmission through the front of the lens. This course addresses the need to make customers aware of how much better they will see through their lenses with a premium AR treatment and of how this hi-tech lens treatment will improve visual comfort, especially after a long day at the computer or when driving at night. Premium AR treatment enhances the patient's vision, eyewear aesthetics, and visual comfort while protecting their eyes and their investment, making it an essential part of every complete eyewear package.

Course Objectives:

Upon completion of this course, the participants will be able to:

1. Differentiate between premium and sub-premium anti-reflective treatments
2. Demonstrate how premium anti-reflective treatment protects their investment and eyes
3. Use the knowledge gained to communicate AR benefits to the patient

Introduction:

The eyeglass consumer places a premium on seeing well and looking well in their glasses. Both of which premium AR treatment enhances. It is perplexing that the percent of eyeglasses sold in the US with AR treatment hovers around 45% (According to the 2019 VC report) when it should be closer to 100% considering all of the benefits to the patient and the practice Some practices report AR sales as high as 95%, with the primary reason being the premium placed on aesthetics. In the US practices that reach 80% and higher AR rates do so because they believe that AR is an essential lens enhancement to improve cosmetics, visual acuity and comfort, and durability. In other words, their patients deserve the best and are always offered the best. And now, with EX3+ AR, not

only will patients look better and see better, but their eyes will be protected from UV transmitting through the front of the lens, and UV reflected off of the back surface of the lens into the eye. An added protection benefit of premium AR is a more durable and scratch-resistant lens surface that protects the patient's investment and a Premium AR warranty that is like having an insurance policy on your lenses., which opens up the AR market for kids. Often parents do not opt for AR treatment for their child because they feel the added cost cannot be justified considering the abuse the lenses will experience with their child's rough and tumble lifestyle. It falls to us, their trusted ECP, to inform them of the protective nature of lenses with anti-reflective treatment, explain how AR protects the lenses to extend the longevity of the lens over non-treated lenses. It is also pertinent that parents understand that their young child's eyes are still developing, making the visual clarity through their corrective lenses a factor for consideration. As kids develop socially, they are in a delicate state regarding their developing self-esteem and self-image. A child needs to feel good about their glasses; if not, they may opt not to wear them, and in turn, sacrifice good vision. Feeling good about their eyeglasses leads to improved wearing compliance so that the child can see well during this critical eye and brain development phase of their lives. For this reason, looking good in glasses is just as crucial for children as it is for teens and adults, perhaps more so.

Patients don't need to hear technical lingo about how a product functions instead they need to hear what's in it for them, how will a product ease pain points and make their eyewear a more comfortable part of their daily existence. A recent HOYA survey identified three key annoyances for eyeglass wearers: scratches, dirt, and reflections. Hmmm, might we know of a product that removes these annoyances for the eyeglass wearer?

As the consumers trusted ECP, you know the benefits of anti-reflective (AR) treatments. You know that AR treatments provide a protective surface layer that increases durability, makes the lenses clearer to see through, and more attractive to be seen in, because they provide a clear view of the world and the wearer's eyes. We promote digital optimized lens technology for its improvements in optics and visual comfort, but we are not maximizing this advanced digital technology unless we add a premium AR treatment. Premium lenses are better with premium AR. To use an analogy that I heard from Mike Hainbridge at HOYA: Would a consumer buy an iPhone 11 at $999 without also purchasing an Otter Box for $50 to protect their investment? When adding a premium AR to their premium digitally optimized lenses, they are ensuring the best optics and protecting their investment.

What is an anti-reflective treatment?

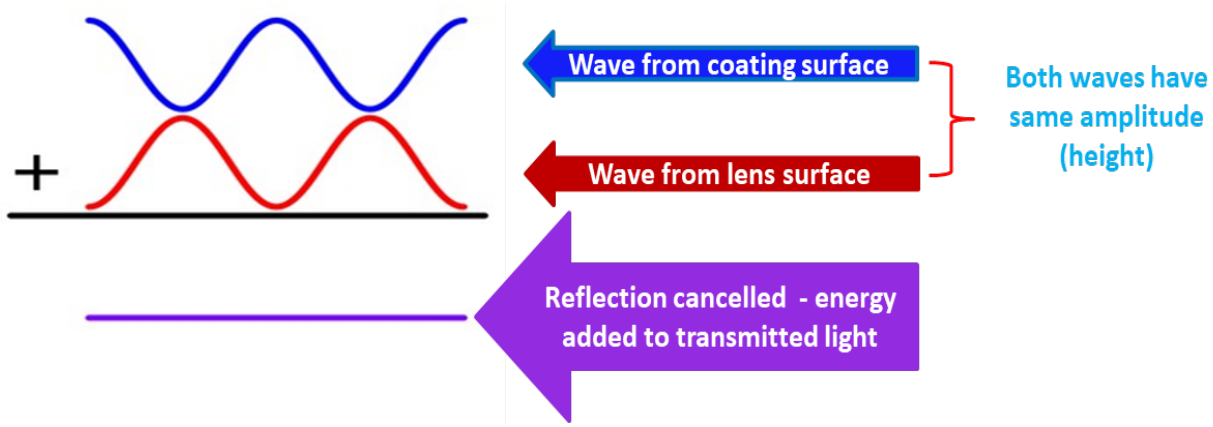
Canceling Reflections:

The basic principle behind AR is to minimize reflections from the front, the back, and internal lens surfaces. But why? Wearing a lens without anti-reflective treatment is very distracting for the wearer as lens reflections degrade lens optical quality impeding acuity, and causing halo's and ghost images that are particularly visible when driving at night. Uncoated lenses lose visible light transmission (VLT) due to these reflections, and we need light to see. The higher the VLT, the better the contrast sensitivity and vision through a lens. In a Vision Council sponsored study by Dr. Janice McMahon, an Associate Professor of Optometry at the Illinois College of Optometry that

compared contrast sensitivity with AR coated lenses versus non-coated lenses, subjects, on average, read one additional line of text under moderate glare conditions when using AR lenses. Reflections from the front surface of the lens obscure the visibility of the eyes behind the lens, which is unattractive and distracting.

The AR stack employs the principle of 'destructive interference' to cancel reflected light waves. Premium AR manufacturers like HOYA create a multi-layered AR stack, aka MAR, that consists of microscopically thin layers of varying indices of refraction to cancel the reflection of multiple wavelength Alternate layers of the MAR ¼ wave thick and ½ wave thick is applied to the lens. The first coats refractive index must be the square root of the lens material. Example CR39 = 1.498 sq root = 1.22 closest index of refraction used. High index to low index layers is built up to cause progressive reflection canceling across multiple wavelengths. This AR stack is applied to the hard coat, which has been index-matched to the lens substrate surface.

The AR Stack:
The light management principal behind anti-reflective lens treatment is called destructive interference. It is used when we want to cancel reflected light waves to eliminate reflectance. Two conditions must be met for destructive interference to cancel the reflected light waves: 1. The waves reflected from the coated surface will be out of phase with the light reflected from the lens surface, and this destructive interference will cancel the reflection of those wavelengths allowing the energy from both waves to combine and travel through the lens to the eye. Light is made up of many wavelengths and each with its index of refraction, so multiple layers (the stack) with varying indices applied. 2. The second condition that must be met is that the out of phase light waves must have the same amplitude (height) in order to cancel each other. The index of the coating must be equal to the square root of the index of the material. The index of refraction and thickness of each layer is chosen to create destructive interference of specific



wavelengths that match the substrate of the lens The HOYA proprietary Substrate Matching Properties (SMP) process formulates each treatment to match the lens material's unique chemistry, which even produces less residual color on the lens. Paramount

Note: Sometimes, we want to increase reflectance such as in mirror coatings, to accomplish this, we use constructive interference to increase the amplitude of the reflected wave.

How Premium AR Technology improves upon sub-premium AR technology:

The premium AR stack consists of a hydrophobic (water repellent) and oleophobic (oil repellent) top layers that seal the surface, creating a smooth, slippery uniform surface that is resistant to fingerprints and smudges or smears. As a result, lenses are easier to clean and keep clean. The coated surface has very high contact angles. The contact angle measures how well a drop of water beads and can be wiped from the surface. A high contact angle of ≥ 110 degrees is desirable to improve cleanability.

Note: Scratch resistance is a top priority for the patient according to a recent HOYA study. Scratches impede vision by increasing the surface area of the lens from which light can reflect or bounce off of, thus impacting the performance of the lens, especially when driving at night with oncoming headlights. The combined benefits of the hydrophobic and oleophobic layers of premium AR are ease of cleaning and the reduced cleaning frequency.

Lenses can have multiple AR coats to achieve anti-reflection across a broad range of wavelengths. The AR stack itself is a multilayered evaporative application of microscopically thin coatings in a vacuum

chamber that is made denser and stronger with ion-beam assisted deposition (IBAD) where an electron pulse facilitates better adhesion and denser stronger coatings during formed from metal elements and silicon oxides. Three key reasons that contribute to Super Hi-Vision premium AR coatings have a superior level of scratch resistance are ion bombardment to control density, plus a unique combination of AR coating materials and unique wavelength AR formulations to cancel reflected wavelengths bouncing off the lens substrate surface.

Underlying the AR stack is the hard coat that provides scratch and abrasion resistance. The hardcoat adheres to the primer, increasing the lens impact resistance. The primer layer sticks to the lens materials and creates the base for the hard coat, and it is indexed matched to the substrate for increased durability of the coating.

EX3+ AR is applied to the front and back surface of the lens HOYA EX3+ anti-reflective coating provides 100% protection against harmful UV light in all lens indices, including 1.50. In combination with HOYA's EX3+ coating, EX3+ helps to protect your patients, and children in particular, from the adverse effects of UV, such as cataract formation and other eye disorders.

Why UV Control? What is UV (UVC, UVB, and UVA), and percent is reaching the earth's surface? The primary source of UV by far is the sun, but there are indoor sources such as tanning lamps, UV sterilizing lamps, and even compact fluorescent bulbs. UV can harm the skin, and the eyes are can reach us from both direct exposure and reflected exposure. Ophthalmic Lens UV Standards ISO states that 100% UV protection in lenses means that the lens blocks UV up to 380nm. HOYA EX3+ provides 100% UV blocking on both the front surface and prevents UV from being reflected off of the back lens surface.

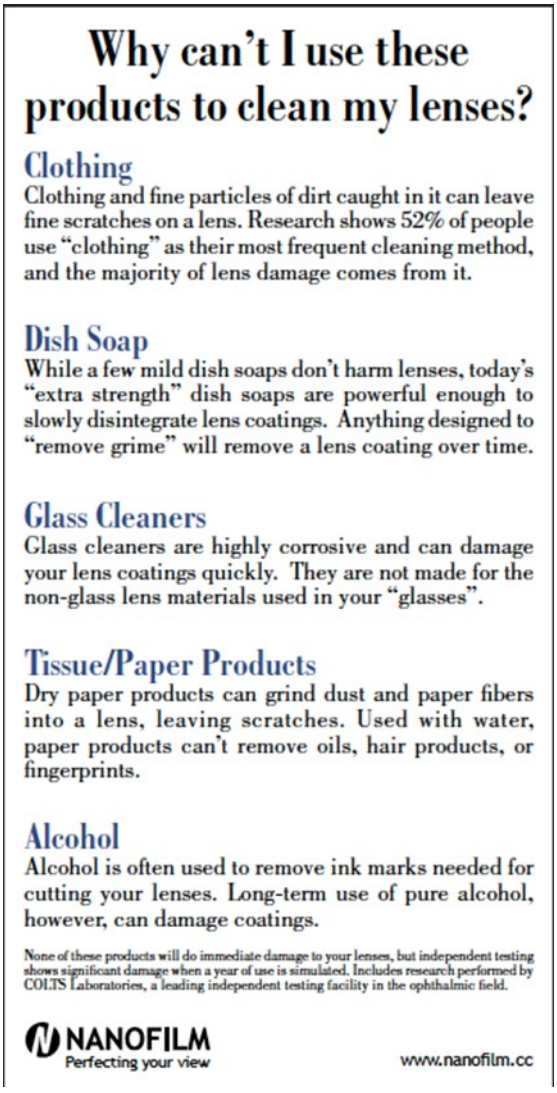
Benefits to Patient:

Protect Their Investment – Premium AR to Extend the Life and Clarity of Lenses

AR treatments and their primer plus hard-coat base increase durability and protect lenses against scratches. Premium AR should have a Bayer Abrasion Rating of higher than 8.

This makes AR more attractive to parents since it will make their child's glasses stand up better to the vigor of kid-use. They will be more apt to invest in a higher price benefit for their child if they feel it will prolong the life of the product. A parent typically wants what's best for their child, and they understand that their kids want to look their best in glasses. They will not only look better and see better, but their lenses will repel dust, meaning that fewer scratches will occur; the lenses will be more durable and will protect their eyes from UV.

Increase ease of cleaning:
Cleanability is a top concern for consumers. The hydrophobic and oleophobic features of premium AR make cleaning lenses and keeping them clean a breeze.



Note: Patients should always be instructed on the correct way to clean their AR coated lenses. They should be informed that proper cleaning will add to the longevity of the lenses. Advise them NEVER to use dry paper products to clean their lenses. Instead instruct them always to use a spray lens cleaner or handy pre-moistened lens wipes that are designed for use with AR and a soft cleaning cloth.

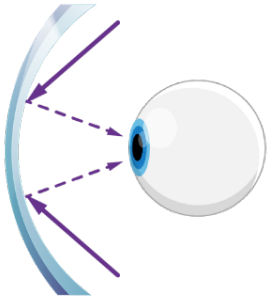
Seeing their best and seen at their best:
AR treatments **enhance vision** by allowing the most light to transmit through the lens. As we age, our pupil size becomes smaller, thereby letting less light in. Since we need light to see, any product that improves light transmission is a bonus, especially for those of us with aging eyes. Another benefit of AR that improves vision when wearing eyeglasses is the virtual elimination of reflected glare on all surfaces and internally. Lens surface and internal reflections contribute to poor night vision, ghosting, and halos.

AR Treatments improve our appearance when wearing eyeglasses by removing mirror-like reflections on the front surface of lenses, sometimes referred to as the windshield effect. Surface reflections from a lens without an AR treatment will obscure the view of the wearer's eyes. AR treatments let others see your eye's instead of the glaring reflection from lenses without AR treatment. Whether in conversation, or when being photographed, or when taking the countless selfies, our Gen-Z and Millennials are famous for, we want our eyes to be seen clearly.

Reduce DES
AR coating helps reduce digital eye strain (DES) by reducing lens reflections, but blue filter tlens treatments ontribute the most to DES reduction by filtering out some of the blue wavelengths of light-emitting as pixelated images from screens. DES is a product of our modern lifestyle where hours staring at digital devices screens result in eyestrain and eye fatigue and even headaches. Short-wavelength blue light scatters inside the eye and producing blur through two mechanisms 1. Scatter defocus due to blue light scattering in the air and inside the eye and 2. Myopic Defocus of blue light rays inside the eye, focusing before reaching the retina at the back of the eye. We all know that light must focus on the retina to produce a clear image.

Moreover, we all know that light that focuses too soon produces myopic defocus. Blue light can be up to-1.00 out of focus. Our eyes are continually straining to bring the defocused blue light from digital screens into clear focus, adding to digital eyestrain.

Protect Your Eyes from UV Rays
AR coatings can also help protect eyes from the sun's damaging rays. EX3+ provides 100% UV protection all around. Blocking UV rays, incident on the front lens surface, and preventing then from transmitting through the lens to the eye and **preventing UV from reflecting off the back surface of the lens into the eye**. This is important because 10% of skin cancers occur in the eyelids and delicate skin surrounding the eyes. UV is directly linked to cataract formation in the crystalline lens, and 90% of skin changes associated with premature aging are linked to UV exposure.



UV Eye Hazards:

Acute UV hazards to the eye include pinguecula and pterygium (benign but unsightly growths) and photokeratitis.

Chronic UV Hazards to the eye include cataracts and even retinal damage that is both cumulative and irreversible that has been linked to age-related macular degeneration (AMD) as one potential contributing factor.

Premium AR over Sub-Premium AR:

Premium AR properties include Super Oleophobic, Hydrophobic, Multi-layered AR, Hardcoat, Primer Index Matched to Substrate. (HOYA's exclusive SMP matches the index of refraction of the hard coating with the lens material and eliminates color fringes and improves lens clarity) These properties make premium AR the highest in durability, the easiest to clean and keep clean, the clearest to see through and be seen through. Sub-Premium AR at best lacks hydrophobic properties, but the quality of Sub-Premium AR can be of such poor quality that index-matching is also missing and making them prone to crazing.

Premium AR Make's Lens Enhancements Better
Whether their digital free-form clear pair or their photochromic pair or their polarized pair, premium AR makes premium lenses better. Photochromic performance is improved. The addition of premium AR improves lens clarity; speeds fade back time in this convenient pair of eyewear. Remember, convenience is a benefit. Polarized and sun lenses are made better since the back lens surface of a tinted lens is mirror-like and can be very distracting. In addition, UV reflects off the back surface of the lens, which is attenuated with premium HOYA EX3+ AR. Other AR coatings can reflect 10% up to 50% of UV radiation, with an average reflection of 20%. (High index lenses have higher than average reflection rates for UV). This harmful backside UV reflected rays into the eyes could potentially result in irreversible damage to eye tissue. Premium AR is essential for high-index, and polycarbonate lenses due to their low abbe value, high dispersion, and high reflectivity. The higher the lens material reflectance the lower the VLT. The higher the VLT, the better we will see through a lens. More than half of the lenses dispensed today are polycarbonate or high index, making premium AR a requisite lens enhancement.

Benefits for the Practice
Build your brand on satisfied customers! When your practice provides the latest, cutting-edge technology to patients, you will earn a reputation as an eye care leader in your community. Your patients will

experience long-term satisfaction with their eyewear, and these happy customers will refer to friends and family and give you five-star reviews online. Reducing complaints and remakes that prolong the life of products maintains positive patient impressions while easing the workload and stress on your staff. And offering warrantied products lets you prescribe premium AR with extreme confidence!

There is an enormous opportunity to grow AR sales from the standard 45% to 95%, particularly once we stop shying away from AR for kids' lenses, recognize that AR is better for them, and will help protect the lens longevity. We have to change our mindset toward AR to one where we know that lenses and the patient experience are better with premium AR.

How to handle objections to premium anti-reflective

On the rare occasion, that someone is opting out of AR due to past experiences explain that Premium AR technology addresses old AR tech concerns and comes with new benefits to make the lenses easier to clean and keep them clean longer and that they are more durable and scratch-resistant protecting their investment. Show them how much better they will look in the treated lenses and explain how much better the will see versus an uncoated lens.

How Can Kids Excel if They Can't See?

A special note on kids and AR: There are so many benefits to parents and kids when an AR coating is applied to the lenses of a child. Rather than cave-in when you encounter a parent's objections, keep in mind that these same parents may be sending their kids to private tutors for school, sport, music and other activities so that the child has the best opportunity to excel. Just as the best gear can be expensive but essential to excelling at a sport, so is having excellent vision. Emphasize that without the protective coating of the lens, not only will the child's vision be diminished by reflections but the lenses are easily scratched uncoated lenses will make the lenses very challenging to see through.

COMMUNICATING THE MESSAGE
Bundle – don't overwhelm them with a menu of ala carte choices – combine the lens and lens enhancements into one packaged price then tell them about the benefits included in the package.

Patients are much less likely to opt-out than to opt-in – bundling increases AR sales. There are practices in the US that report 95% AR penetration because they bundle to ensure that their patients receive the best.

1. Tell the patient that their Premium lens package includes premium AR and share all the ways they will benefit, such as looking better, seeing better, easier cleaning, and more durable to protect their investment. The most effective way to convey that they will look better is with an AR demonstration. Show them how they can see your eyes with AR and then put on eyeglasses with a demo lens and have them compare how much better the lenses look and how much nicer it is to see your eyes clearly through the lens. You can also make up a demo pair of glasses with one lens coated and the other uncoated. Your professional recommendation is key, confidently recommend what you believe is the best for the patient, and they will respond because you are their trusted advisor in their eyes. Be sure to wear it yourself and describe your own experiences.

Seeing is believing for the patient. Use point-of-purchase materials, demonstrate AR using a pair of spectacles where one lens is coated, the other uncoated.

2. Also, describe that the entire lens package is now warrantied when they use the best in AR. Like the best of consumer retail, high confidence by the manufacturer means they stand behind their products, and that's why you recommend them.

    - **Benefits Answer**: How will their life will be Improved by the product? (See, look, feel better, improves comfort, safer, health, more protection, convenient. easy-clean, stays clean longer, low maintenance, last longer)
    - **Features Answer:** What is it, what does it do? (blocks lens reflection and reduces lens glare, scratch-resistant, impact-resistant, hydrophobic and oleophobic.

3. Use the MVC benefits allowance to cover basics while making premium features/products such as AR more affordable Always present MVC as the amount they are saving on their eyewear, not an allowance cap. You don't want the patient feeling that they have a ceiling that that can't exceed. Instead, you want them to see how the beautiful premium pair of eyewear that they want is made more affordable with MVC. In fact, let them know that MVC has already paid for part of it, may as well get it!

MVC – There is no doubt that MVC plans bring more and new patients through the door, but we mustn't assume that patients are only interested in what the plan "covers." They deserve the best just as every other patient walking through the door so:

1. Show them the best lens (s) to suit their vision needs, the same as you would for any patient.
2. Learn about them to better serve them, use a lifestyle questionnaire to determine what lens options would best suit their occupation, pastime, or hobby visual needs.
3. Suggest all eyewear that's needed so that they have the comfort, protection, and clarity for all aspects of their life when working and playing.
4. Show the patient the value of what they selected and how the MVC savings reduced out of pocket costs.

Note: Premium AR has a higher reimbursement rate over standard.

With HOYA premium AR each layer is engineered to work synergistically with the other layers

The applied AR process is uniquely engineered for the specific index of materials.
Each material is batch-specific *for*

- Consistency
- Optimal adhesion, durability and lens life
- Optimal elasticity
- Precise AR residual color matching
- Less residual color

In conclusion: Premium AR makes great lenses better! It is a practical lens enhancement for children because it makes their eyewear more durable, less scratch-resistant, and cosmetically more attractive, which is a confidence booster for kids who wear glasses. It ensures the acuity and visual clarity designed into digitally optimized lenses are maximized. It makes the lenses more durable protecting their investment. EX3+ AR also removes rear surface reflections of harmful UV as well as front surface UV transmission. Protects the eye of your patients from this harmful radiation. AR is critical to all high-index and polycarbonate lenses since surface reflections are index dependent. Over half of the lenses dispensed today are polycarbonate or high index, makes AR an indispensable addition to increase light transmittance and reduce reflections. Every pair of lenses benefits from the application of premium AR.