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Living the AR Life — Better Vision, Happier Patients, Business Growth

By Tom Pfeiffer

Ah, I can see it now. Virtually all my patients wearing the best anti-reflective lenses, happier with their vision, seeing the best that they can, driving safer at night and my business is booming. It's all because I can deliver the best AR lenses; patients rely on my advice and they purchase additional recommended new products. In fact, if you want to reach me send me an email at layingaround@beachbum.com.

What, that's not the way it is? Only about one in five actually buy AR lenses, many complain about those lenses they had a while back that had been so hard to clean or scratched so easily or just don't know that AR or anti-glare lenses even exist. According to a study by Jobson Research and the Vision Council of America, when asked if consumers would purchase

lenses that were anti-glare, improved night driving, allowed them to see and look better at a fair price, about 57 percent said yes. However, only about 23 percent actually do. So, someone or something is getting in the way.

Hold that Mai Tai—there's some serious work to do.

THE MARKET AROUND YOU

This is hard to understand since most eyecare professionals and staff seem to agree that the best AR lenses perform terrifically. They are pretty hassle free for the wearer and therefore the ECP so it's easier to add them to most patients' prescriptions. So, what's the problem?

It turns out that there are

differences in the AR products available, all don't perform exactly the same and an understanding of those differences can help any ECP create the right expectation for a patient. This could result in more AR used by more patients.

Also, regardless of the technology, one has to describe AR so a patient can understand its benefits and see its value. This has been the same for a long time but the results now best meet the expectation. Therefore, sell AR on cosmetics, performance and vision enhancement. Besides, it makes good business sense.

Let's review the components needed to "Live the AR Life":

1. The intent versus actual purchase disconnect.
2. Understanding patient attitudes about eyewear and product reliability while meeting them head on with the AR challenge.
3. The technology and performance of premium AR.
4. The factors that dilute a confused market.

INTENT VS. ACTUAL DISCONNECT

Intent to buy is when a consumer likes the attributes of a product and believes that product provides value at its cost and purchases it. In the case of anti-reflective lenses, when consumers are described the benefits of AR, its care and costs, about 57 percent of those intending to buy glasses in the next six months tell us they would purchase AR.

However, of the consumers surveyed, only about 22 to 23 percent of them had purchased AR. This suggests that some of the 35 percent were discouraged from buying; others may have opted for another add-on or a second pair to fit their budget and some were not offered AR at all. The curious thing about intent numbers like these is that just describing the benefits of AR and its effects on vision would automatically raise usage.

Therefore, to reduce the gap talk AR to every patient. They deserve it and they should be told to treat themselves to better vision than delivered by an ordinary pair of non-AR lenses. Wear AR yourself so explanations are from personal experience and demonstrations are close at hand.

MEETING THE AR CHALLENGE

Let's face it; many of our patients don't like buying eyeglasses for any variety of reasons. So discussing things other than the frame and lenses may

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Learning Objectives:

Upon completion of this program, the participant should be able to:

1. Detail new primer, hard and AR and topcoat coating technologies.
2. Review the differences between categories of coatings and testing methods used to suggest patient satisfaction (ease of cleaning, Bayer, tumble test, real life simulation, QUV weather testing, etc).
3. Learn the characteristics of the final product when substrate, dual hard coats, AR and super hydrophobics are correctly chemically matched.

Faculty/Editorial Board:



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seem to them like selling extras that are unnecessary. It couldn't be further from the truth.

First, put the objections of past performance or any lack of it to bed. Current premium AR is made up of special hard coats, highly compacted AR and super hydrophobics that repel dirt and particles.

Next, decide which AR and what performance is offered to each patient. Many offices prefer to always offer the best AR where possible so it simplifies the choice and description used. The newest and best AR products are clearer and stay damage free longer. It's not that the lenses won't ever scratch but the damage is harder to cause. New AR is easier to care for since unlike older AR, fewer particles stick and oils are easily wiped away. As a result, lenses stay cleaner and deep scratch free longer.

PATIENT ATTITUDE AND THE AR CHALLENGE

All AR provides improved vision, improved cosmetics and is patient satisfaction guaranteed but that is where the similarities end. Today, AR is segmented in performance and pricing. The differences in AR are related to the manufacturing process and the materials used.

In addition, all AR provides glare control i.e., the surface and coating reflections destructively interfere so that the result is the elimination of the majority of surface reflections. In this case, the glare eliminated is called distracting glare which causes eye fatigue, reduces a wearer's acuity and masks a wearer's eyes by reflections. However, the resulting stack of metal oxides that creates the anti-reflective surface can be controlled to produce varying levels of brightness of a reflex color and varying levels of transmission. Lenses from different manufacturers and AR laboratories come in different reflex colors and brightness. Which is best? Does the patient benefit from the differences? Let's investigate the differences.

AR is currently available on the full variety of lens materials in clear, pho-

Say this to all patients:

- Your glasses look great when the lenses have no reflections and you look even better.
- Vision is improved when reflections and glare is eliminated. AR lenses do just that in everyday situations, in front of the computer and especially at night.
- Clearer lenses help improve communication.
- For teens, AR helps make glasses disappear.
- For adults, AR makes you see and look better.
- For the senior, AR is critical for the best vision all day, everyday.

Use these words when needed:

- Treat yourself.
- I know that you don't want to spend for this lens that's anti-reflective but it is important for your vision especially at night. Take care of your senior patients with the clearest lenses possible. A 65 year old needs nearly six times the amount of visible light than an 18 year old.

tochromic and sun lenses. The result is AR availability with any ophthalmic product and that makes it easy to be able to talk AR lenses with every patient. Here's the challenge—recommend AR to all patients, regardless of the prescription, lens design, material or treatment, occupation or use. Why? Because more reflections cause more problems regardless of who's wearing them. And, AR lenses are better for your business. To better talk AR, read on.

THE BEST IN AR STARTS WITH THE BEST LENS PREPARATION

Understanding the differences in AR coating and hard coating (HC) is one of the most important aspects of quality coated products. Each manufacturer has a proprietary AR stack formula based on the hard coat and substrate chemistry. Formulas can vary by material, layer thickness, application time and reflective hue color.

In the past, AR coaters simply used one AR coating process for all lenses, regardless of substrate, hard coat or lack of hard coat. Today's AR coaters know the importance of a hard, solid substrate (hard coat), on both sides of the lenses as the base for AR coatings. A high-quality hard coat is essential to maximizing the durability of the lenses against scratching.

Hydrophobic topcoats were first introduced in the early '90s to help seal the AR coating and to provide for a slicker, lower friction coating that repels water. Now, oleophobic topcoats have been introduced that further increase the slickness, scratch resistance and cleanability of AR products.

THE AR AND HARD COATING RELATIONSHIP

Hard coats are tintable or non-tintable and thermally or UV cured. Each of these types of hard coat can be applied using a dip or a spin method.

Since the AR will only be as hard as the substrate under it, it is imperative that the layers under the AR be controlled. Tintable hard coats are generally softer and more porous than non-tintable hard coats. While tintable coatings make it easier to apply a sunshade tint, the soft surface is not optimum for an AR coating. On the other hand, most non-tintable hard coats offer a hard stable surface that is an excellent substrate for the application of an AR coating, but can not be tinted.

Thermally cured hard coats are cured in high temperature ovens over a period of several hours. UV-cured are cured with a UV light for several seconds to a few minutes, depending on application. Generally, it is agreed that a thermally cured hard coat has a higher Bayer rating (hardness and abrasion resistance). While some UV cured coatings are beginning to approximate these higher Bayer results, thermally cured coatings are still considered the best.

Dip hard coats are applied to both sides of the lenses during a controlled dip process. Dip hard coats offer advantages to spin in that they cover the front and back surfaces and can be applied to any lens style including flat top segments.

Spin hard coats, on the other hand, are typically applied only to the back surface. This can be a problem as the front side could be a factory applied thermal coating and the back side is UV cured. Patients may experience significant scratching on the back of the lens and very few on the front.



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While hard coats can be applied in a number of environments through a large range of equipment, best results are achieved when the application is stringently controlled by using a dip coating applied equally to the front and back sides.

PREMIUM PRIMERS

While not included in all hard coating processes, a primer layer can offer real advantages to the adhesion properties and impact resistance of AR lenses. First, this layer is very sticky and can be attached to virtually any lens substrate. It is just as sticky to the next layer hard coat and one can use the hardest, most scratch-resistant hard coat since it sticks to the primer.

A proper primer layer can add significant shock resistance especially to thin center lenses. This allows for a more consistent, controlled hard coat and AR stack application. Using a premium primer layer as the first step in the HC process, AR coaters more closely control the overall quality and durability of the end product.

LENS QUALITY

Lab in-line quality control checks throughout the surface process, ensures the highest possible surface quality.

Residue from wax blocking can cause contamination of cleaning and hard coating equipment and eventually cause adhesion failures to the coating layers. AR coaters must use special cleaning processes to ensure all wax particles are completely removed before AR coating. The lab should use surface saver tape for lens protection and reduced contamination. It is best recommended to ultra clean the lens after surfacing.

Any defect that is on the lens prior to AR and hard coat application will generally be more apparent and pronounced once the AR is applied. Scratches or defects that seem minute prior to AR coating will be more pronounced after AR due to the reduced surface reflections. It should also be pointed out that due to differences in application techniques and coating flow variations, dip hard coats may not fill in scratches or voids as readily as in-house lab spin hard coats.

AR COATING TECHNOLOGY

Single-vision stock AR lenses are produced en mass by lens manufacturers and AR coating service centers and sold as finished AR lenses. All other lenses i.e., multifocals and surfaced single-vision lenses are custom coated. For example, iCoat Company and Opticote are custom and regional coating labs while Custom Eyes, SOLA Technologies, Expert or VSP are examples of in-lab AR. In each of these facilities a variety of AR can be produced.

Front, back or both surfaces? — For AR lenses to work best, AR is required on both lens surfaces. Front and back surface reflections are additive and get worse as the index increases. In fact with almost half the lenses today at higher indices, the need for AR is more important. On sun lenses the requirement is even more extreme since a dark tinted or polarized lens acts like a mirror and reflects light and images on the lens back surface. In addition, the concave shape of the back lens surface magnifies

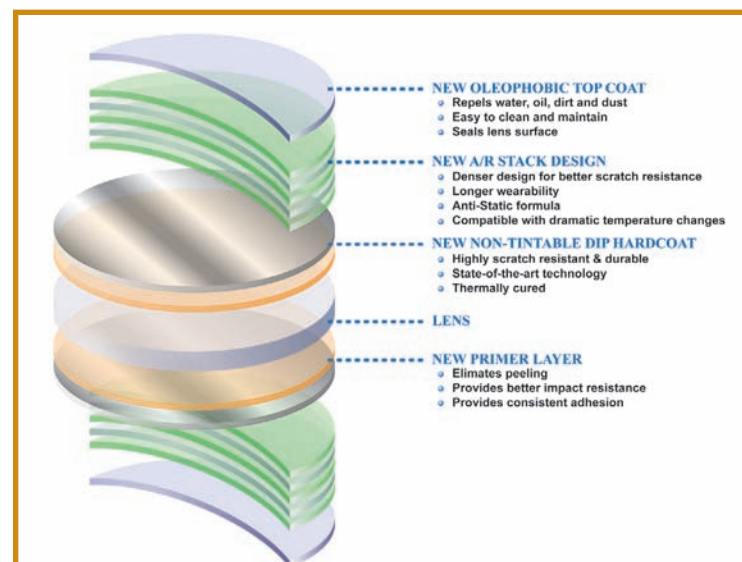
images (think of a make-up mirror) so sun lenses can create a back reflection that is large and block high-performance vision when it is needed.

Photochromics — Photochromics are activated by UV therefore, any AR applied should not absorb any UV radiation. As a result, AR laboratories work closely with the photochromic lens manufacturers to ensure a “UV pass” AR. If the AR affects the performance of the photochromic, talk to your lab.

AR Durability — As stated earlier, the durability of an AR lens is primarily a function of the durability of the surface on which it is applied. Therefore, the more durable the hard coat or the substrate,

Material	Index	Percent Reflection
Plastic	1.50	~8.0%
Polycarbonate or High-Index	1.59	~11.0%
High-Index	1.67	~12.5%
Ultra-High-Index	1.74	~14.5%
Dark Sun Lenses	any	Highly reflective

the more durable the AR lens. So, glass AR lenses have the best surface durability but not necessarily the best impact resistance. With that as a measure, we can then see that AR applied directly on a lens surface without hard coat makes the durability only as good as the lens material itself.



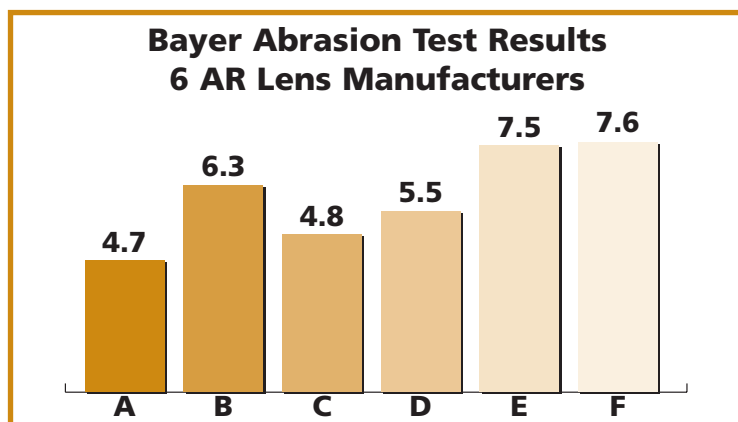
Therefore, materials very sensitive to abrasion and scratches need excellent hard coats for excellent AR performance. It is in this that AR lens durability varies from supplier to supplier. Suppliers should be able describe the effectiveness of durability test results. Other technologies improve durability by compacting the AR molecules and layers. For best results, start with uncoated lenses and apply hard coats to both surfaces simultaneously. Too hard a surface may compromise impact resistance.



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HOW MANY LAYERS OF AR?

The number of AR layers is determined by the manufacturer but more doesn't necessarily mean better. There are always an uneven number of layers i.e., three, five or seven typically in spectacle lens coatings. Denser designs improve scratch resistance and the layers are tuned for better temperature change resistance. The top most layer in premium AR is an oleophobic topcoat.



The higher the value the more abrasion resistant the AR lens. Bayer testing abrades an uncoated plastic lens standard and measures haze gain after oscillating in a sand bath. The resulting number is the ratio of how many times better the AR lens is in resisting abrasion (haze). For example, lens F is 7.6 times more abrasion resistant than the uncoated plastic test standard and more abrasion resistant than four of the other lenses tested.

EASE OF CLEANING

Newer premium AR lenses are easy to clean. Gone are the comments: "I can't keep my lenses clean." This new cleanability is what makes new premium AR easier to sell. An oleophobic property causes oils and liquids to bead into tighter balls making it easy to wipe them away. In addition, the best topcoats will no longer trap those oils and smear when wiping.

For dust and airborne particles, the denser packed surface provides an anti-static property that doesn't attract dust and dirt. With fewer particles attracted to the lens surface, lenses scratch less and stay cleaner longer.

REFLEX COLOR — I'M GLAD IT'S THERE

High transmission is a function of low surface reflectance. However, AR coatings have colors and this is a result of higher reflectance of specific color wavelengths. Is one color better than another? Not necessarily, however some patients do not like bright reflex colors. As a result, the muted yellow/green, green or blue/green colors are more preferred.

Should coatings be colorless? Most of the sophisticated improvements like design or UV absorption we sell are invisible. Often, I can imagine the patient wondering if they received what they paid for. This is not the case with AR lenses. The reflection color tells them they received what they paid for. Don't hesitate to point it out.

NOT TOO CRAZY ABOUT CRAZING

Thin centered lenses can crackle the coating when compressed or bent. This is called crazing and shows up after edging or when patients have exposed their glasses to temperature extremes. That also means lenses can be crazed in the salt pan, hot air blower or the dashboard of a car.

Crazing is often not seen easily but should be suspect when the patient returns saying "they cannot get their lenses clean anymore" or "all of a sudden, the lenses are not as clear." The all of a sudden is your clue. To see a crazed lens hold the lens below a bright spotlight and the crazing will light up. Don't look through it—look at it.

PROPER CARE

While today's premium AR lenses are much more durable than standard AR of the past, products still need proper care to ensure their longevity. AR coated lenses should be cleaned on a regular basis, whenever possible cleaned wet and stored in a case. AR lenses should never be left on the dashboard of a car, near other heat sources or exposed to harsh chemicals. Care should also be taken in the lab or dispensary when adjusting frames with AR lenses in them as the heat from a salt pan or hot air blower can cause crazing and cracking.

In summary, have total confidence in the premium AR lenses currently available. By taking the time to research their choices, eyecare practitioners can offer AR to each and every patient and have the confidence that the product will last. The developments and technology advancements in equipment, processes and chemistry help immensely in promoting AR as an obvious choice for each and every patient's pair of eyewear. ■

Tips on Edging AR Lenses

(source: AR Council)

- Cut the lens down slowly in several steps.
- Use a plastic film tape or surface-saver tape between the leap pad and both front and back lens surfaces.
- Try a plastic block on the front side.
- De-block the lens immediately after edging.
- When de blocking, put it into warm, soapy water to ensure the block comes off easily. Pulling the block off dry can cause stress cracks in the coating.
- Equalize the chuck pressure on both sides of the lens to eliminate lens flexing and make sure the block and the diameter of the clamp are the same size.
- Minimize operator handling of the lens to reduce the opportunity of scratches occurring.
- Maintain a meticulously clean lab environment, as any foreign particle on hands, in the job tray or in the work area could cause scratches.

If not comfortable edging AR lenses yourself, the entire job can be sent to your lab for processing.



Self-Assessment Examination

1. Today's AR coatings are basically all the same.
 - a. True
 - b. False
2. AR coatings improve:
 - a. Cosmetics
 - b. Performance
 - c. Vision
 - d. All of the above
3. Current sales of AR coatings in the United States are about:
 - a. 23 percent
 - b. 12 percent
 - c. 35 percent
 - d. 55 percent
4. A 65-year-old patient needs approximately this much more visible light than an 18 year old?
 - a. Two times
 - b. Three times
 - c. Six times
 - d. No more than an 18 year old
5. The best performing AR coatings of today include:
 - a. Special hard coats
 - b. Highly compacted AR layers
 - c. Super hydrophobics
 - d. All of the above
6. Distracting glare causes all of the following except:
 - a. Eye fatigue
 - b. Reduced clarity at night
 - c. Reduced photochromic response
 - d. Surface reflections
7. AR coatings are available on what materials?
 - a. CR-39 only
 - b. Polycarbonate only
 - c. Mid/High-Index only
 - d. All lens materials
8. The two most common ways to apply lens hard coats are:
 - a. Brush and Spin
 - b. Spin and Dip
 - c. Dip and Brush
 - d. Spray and Brush
9. Bayer is one measure of what performance characteristic?
 - a. Tintability
 - b. Color balance
 - c. Abrasion resistance
 - d. Transmission percentage
10. For AR coating to provide the clearest vision it needs to be applied to:
 - a. Front side only
 - b. Back side only
 - c. Both sides
 - d. On the edges of the lens
11. Applying a good hard coat and AR coating:
 - a. Will cover all substrate scratches and pits
 - b. Allows tintability in through the AR to the hard coat
 - c. Improves the durability of the AR
 - d. All of the above
12. Adding an AR to photochromics does all the following except:
 - a. Improves the patient's vision through the lens
 - b. Negatively adds to the transmission of the lenses outdoors
 - c. Allows better visibility of the patients eyes
 - d. Improves the overall look of the eyewear
13. To improve the abrasion and scratch resistance of an AR lens:
 - a. Apply AR to a very hard substrate surface
 - b. Use the most abrasive and scratch resistant coatings that still provide impact compliance
 - c. Ensure that all layers are chemically tuned to each other
 - d. All of the above
14. The best number of layers to apply to an AR lens is:
 - a. Three
 - b. Five
 - c. Seven
 - d. An odd number of layers that delivers the intended performance
15. Improved cleanability of AR lenses is a product of:
 - a. Hydrophobic performance
 - b. Oleophobic performance
 - c. Dual surface application
 - d. All of the above
16. All the following is true about the reflex color of AR lenses except:
 - a. The reflex color is from increased reflectance of a particular group of wavelengths
 - b. Dye added by the manufacturer creates the color
 - c. Can be used to recognize and to differentiate a particular manufacturers coating
 - d. Reflex color usually doesn't affect the visual performance of the AR lens
17. Crazeing is:
 - a. A cracked coating
 - b. An improvement to the surface structure of AR
 - c. A loss of AR adhesion
 - d. A result of AR on too thick a lens
18. When edging AR lenses in-office, do all the following except:
 - a. Apply a surface saver pad to both surfaces
 - b. De-block the lens immediately after edging.
 - c. Pull the block off dry with a sharp snapping movement
 - d. Equalize the chuck pressure on both sides of the lens
19. To improve the scratch free life of AR lenses, do all the following except:
 - a. Clean on a regular basis
 - b. Wash whenever possible
 - c. Store in a case
 - d. Store in the case near good heat sources
20. To have confidence in dispensing AR lenses:
 - a. Research the choices available
 - b. Offer AR to each and every patient
 - c. Use AR lenses that incorporate the advancements in equipment, processes and technologies
 - d. All of the above

