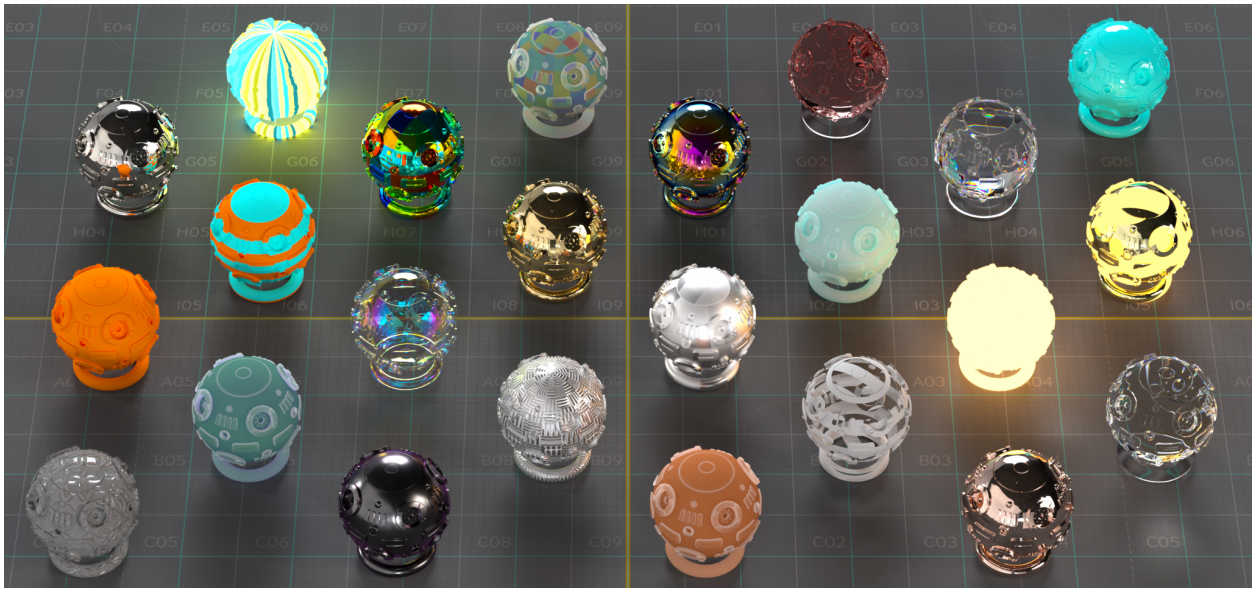


Octane Basics

Universal Material Channels Deep Dive

Version **2.0**, Updated September 2022 using Octane 2022.1

About This Guide

This guide is a deep dive into the channels found in the Universal Material. If you need a primer on what the Universal Material is and how to think through building a material using it, check out this guide

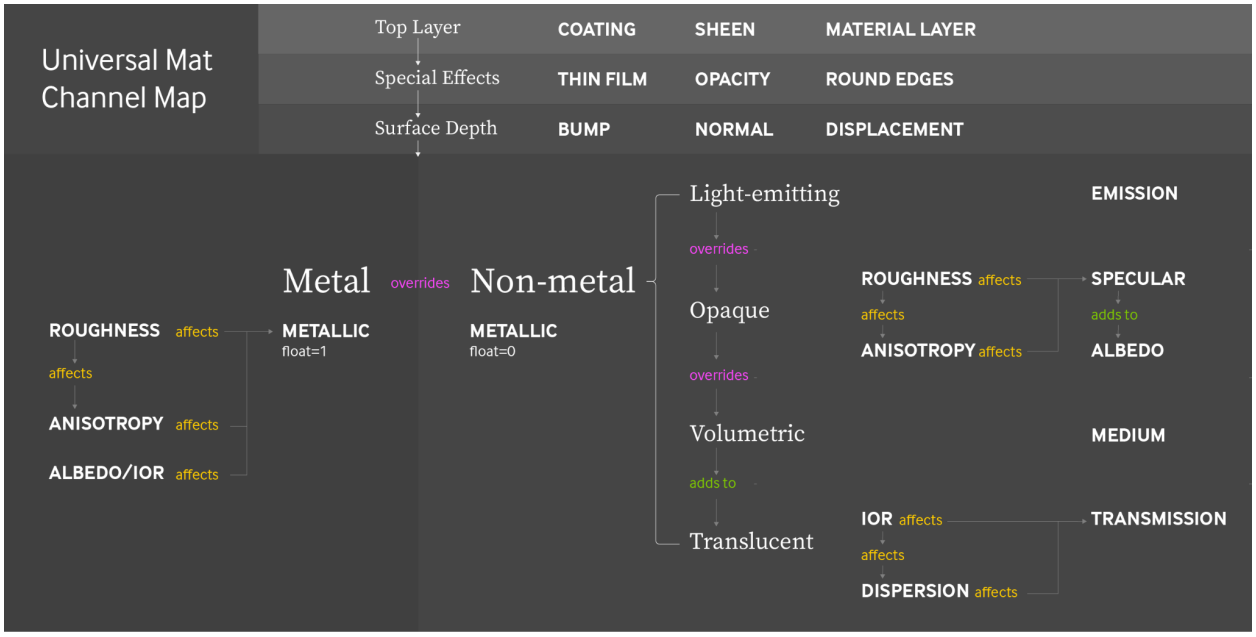
Please consider throwing some ETH at scottbenson.eth , or 0×1eefacda68e0842957849eb533b368ed2291c2fe to say thanks :)

Downloads

A c4d file containing a shaderball and various materials created using the universal material can be 📥 downloaded here. A full writeup and images of all the materials can be found here.

Introduction

The Universal Material was introduced in 2018, and remains the most versatile way to make nearly any type of material you can think of. All Octane materials are broken down into channels, and the Universal Material has quite a few of them. Below is a diagram that shows how the channels relate to one another. If this is overwhelming, skip ahead, learn about all the channels, and then when you come back and reference this, it should make more sense.



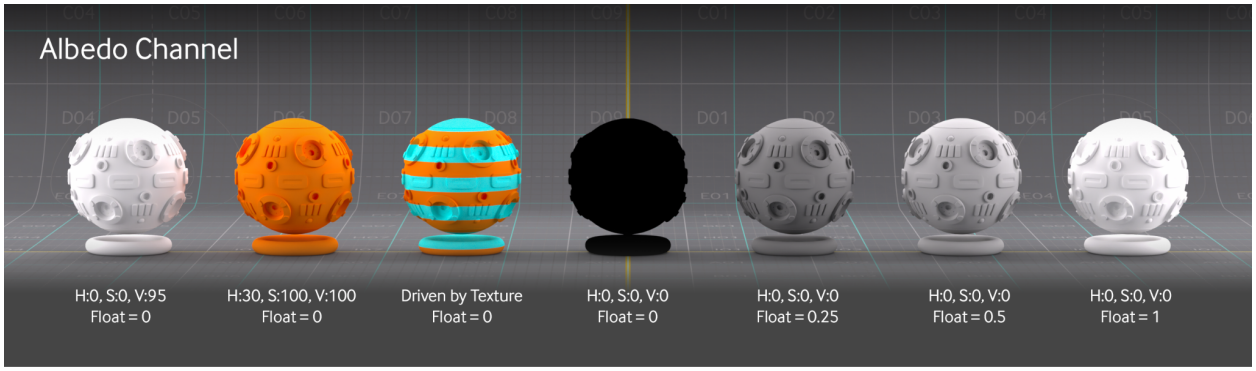
Basic Property Channels

The **Albedo, Specular, Metallic, Emission, and Transmission** channels control the material's basic properties.

Most of these channels should be an either/or situation, where the other channels in this section are **turned off** (have no contribution), so the material doesn't get muddy or difficult to work with.

Albedo alone without any other contribution makes a perfectly matte material. Albedo + Specular makes a glossy opaque material like plastic. Metallic alone makes a metallic material. Emission alone makes a light-emitting material, and Transmission alone creates a translucent material like glass/water/wax/jade/etc.

Albedo Channel



The Albedo channel (referred to as Diffuse in other apps and even other places in Octane) controls the overall color of a non-metallic opaque material (matte or glossy, like plaster, stone, wood, etc.) It also colors a metallic material which is using the Artistic IOR type.

This channel can be controlled by float (0 = black, 1 = white), or by the Color picker, or by a Texture input.

This channel should be set to have no contribution (color of H:0, S:0, V:0, and float=0) when making a Transmissive (glass/sss), Emissive (light-emitting), or RGB IOR type metal.

PBR map: Albedo, Basecolor, or Diffuse

Specular Channel

The Specular channel determines how reflective a non-metallic material is. The Specular color affects both the intensity and color of the reflections. The lighter the value (closer to white), the more intense the reflections will be.

This channel can be controlled by float (0 = no specular, 1 = full reflection intensity), or by the Color picker (lighter the color, the more intense the reflection is), or by a Texture input.

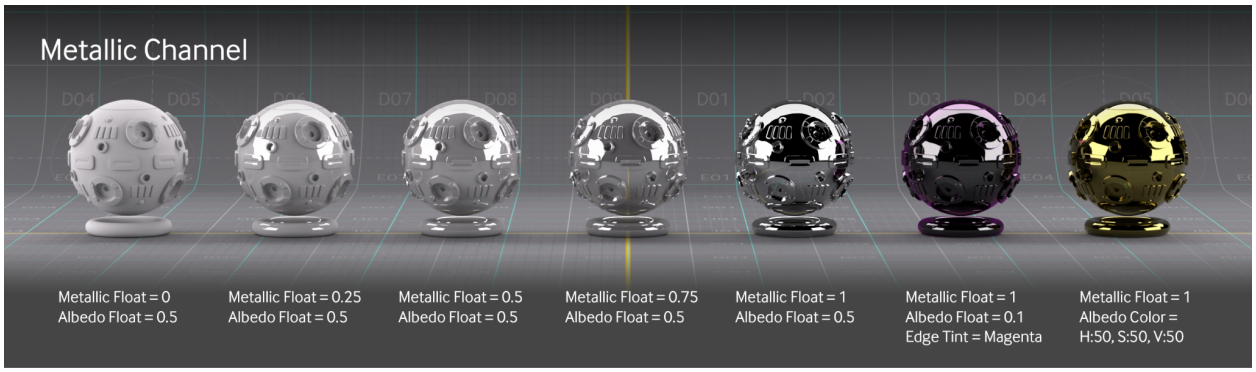
The IOR channel (dielectric setting) affects how glossy/reflective the Specular channel is. Most real world materials don't have an IOR of more than 2 or 3, so if you need it to be more reflective, consider using the Metallic channel instead.

The Metallic channel **overrides** the Specular channel, so determine whether you want a metallic material or not, and then pick one of the two channels to use.

By default, the **float** in this channel is set to **1**. This means that even if the Specular color is set to black, the material will still be reflective. Set the float to **0** to make a matte material, or if you are making a Transmissive or Emissive material.

PBR map: Specular

Metallic Channel



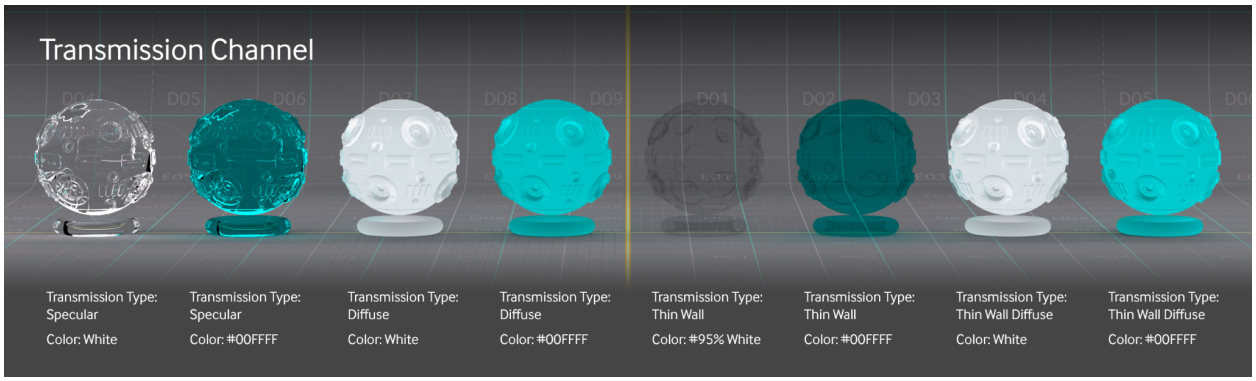
The Metallic channel makes a material more or less, well, metallic. **This channel overrides the Specular channel**. It's best to first decide whether you want the material to be metallic or non-metallic, and then either set the slider to 0 (not metallic) or 1 (fully metallic).

There are three methods Octane uses to set the color and reflection intensity of metal materials. The controls for this are in the **IOR** channel and will be discussed more in that section. By default, the Universal Material is set to the Artistic type IOR, which means the **Albedo** channel is used to control the color.

The Metallic channel also has an **Edge Tint** property where you can set a color value, and it does exactly what it says - tints the edges of the object relative to the camera. This only works if you're using the Artistic IOR method in the **IOR** channel.

PBR map: Metallic

Transmission Channel



The Transmission channel controls the translucency/refractive nature (not Opacity - that's a different channel) of the material.

The four different Transmission Types produce very different effects.

Specular is mostly for glass, liquids, and glossy minerals like gemstones. Use the IOR Channel (Dielectric) to control how light bends through this type of material. This mode works well with the Absorption medium to create realistic liquids, or the Scattering/Random Walk medium to create minerals or cloudy liquids.

Diffuse (default in Octane 2022) is for semi transparent solids. When combined with a Scattering or Random Walk medium, it's great for skin, plastics and other non-glossy semi transparent materials.

Thin Wall (Specular) is for something like a soap bubble or very thin plastics or glass (blown glass ornament, etc). By itself it's difficult to see this effect, so it needs either some contribution from the Specular channel or a Coating Layer to really stand out.

Thin Wall Diffuse is great for leaves, lampshades, and other very thin objects that still have a strong subsurface scattering effect.

Interaction with Other Channels

Important: The **Albedo** and **Metallic** channels **OVERRIDE** the Transmission channel. When you start building a transmissive material, set the values of those channels to **0,0,0, float=0**.

The **Specular** channel is controlled by the same IOR as Specular type transmission, so it's a good idea to remove the contribution from the Specular channel. If a glossy finish is

needed for the material, consider using a **Coating** layer instead where you can control the IOR separately.

Dielectric **IOR** and **Dispersion** have a strong effect on Specular type Transmission, and no effect on Diffuse type Transmission.

The **Medium** channel adds scattering and absorption effects to a Transmissive material (jade, skin, oil, wax, etc)

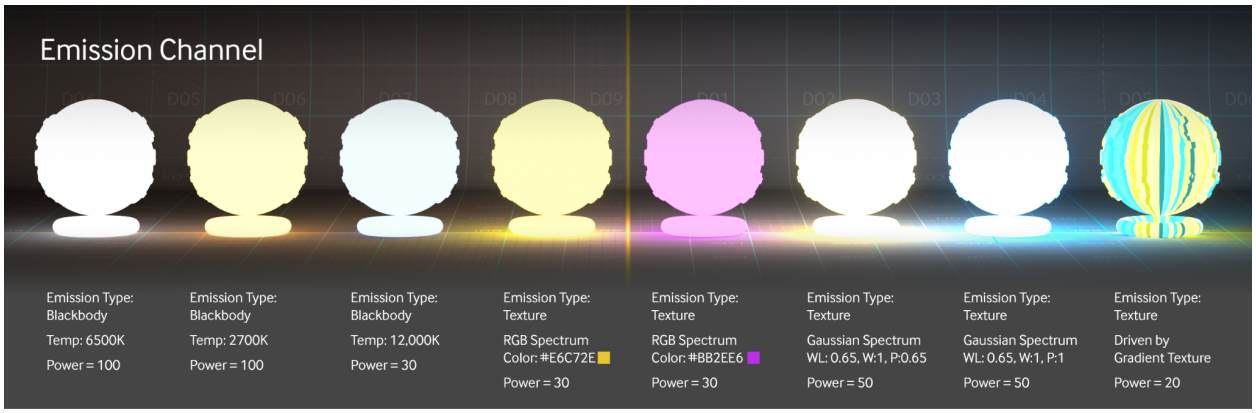
Coloring a Transmissive Material

It can get really confusing and frustrating when building a material if the color is coming from multiple channels that override each other. Restricting the color controls to one place will help you keep your sanity.

Ideally all of the color properties of a Transmissive material should come from either the Color setting in the **Transmission channel itself**, or if you're using a medium, from the Medium channel.

PBR map: Transmission

Emission Channel



The Emission Channel turns a material into a light source. This channel requires an Emission node hooked up to it to have any effect. These nodes can be hooked up automatically by clicking the "Blackbody emission" or "Texture emission" buttons in the UI, or manually through the node editor.

It's usually a good idea to turn on **Surface Brightness** - this scales the power of the emission based on the size of the object it's applied to, so small objects won't be obscenely bright and large ones won't be super dim. This allows for a better chance that you won't have to customize a copy of the material for every mesh you put it on.

Blackbody Emission is a physically accurate light source. There's some scientific reason it's called that, but just think of it like real-world lights you find in a hardware store. The color of the light is determined by the temperature. A warm light like a candle (1,900K) or an incandescent bulb (2,800K) is on the low end of the spectrum. Octane's default white is 6500K. Above that it starts getting more blue, with stars getting up to 12,000K (Octane's max). Power plays into this a lot too - if the power is high, the visual difference between 6500K and 12,000K is almost nothing, but as you drop the power, you start to see the color come out.

Texture Emission This is far easier to art direct, since you can just say "I want a green or pink light". You can pipe anything into the texture section (like the checkerboard seen above) and produce some cool effects. Generally you'll want to put either an RGB Spectrum node in, or a Gaussian Spectrum node.

RGB Spectrum is easy to visualize and good if you want the light itself to look like the color it's casting.

Gaussian Spectrum is trickier because you can't just pick a color - you have to be all sciency about it (read: play with sliders until you get what you're after), but it does produce better results for neon, as seen in the image above. Dobromir Dyankov has a terrific writeup about this.

Interaction with Other Channels

Emission overrides Albedo, Specular and Metallic, but if the light isn’t intense enough, these other channels will start to show through. Most of the time you'll want to remove the contribution of the other channels and focus on the quality of the light itself.

Camera Imager settings

There are three settings in particular you want to pay attention to for emissive materials:

Bloom and Glare in the Post section controls how much the lights appear to glow or streak in the final render, and this can add a lot of visual interest and cinematic quality to the render.

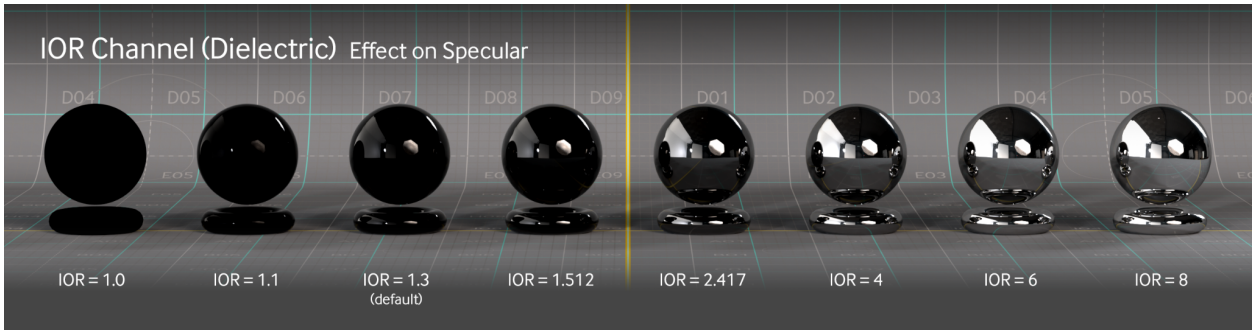
Saturate to White in the Camera Imager section makes it so the light itself starts turning white as it gets hotter (power goes up), which can be seen in real life neon and the like.

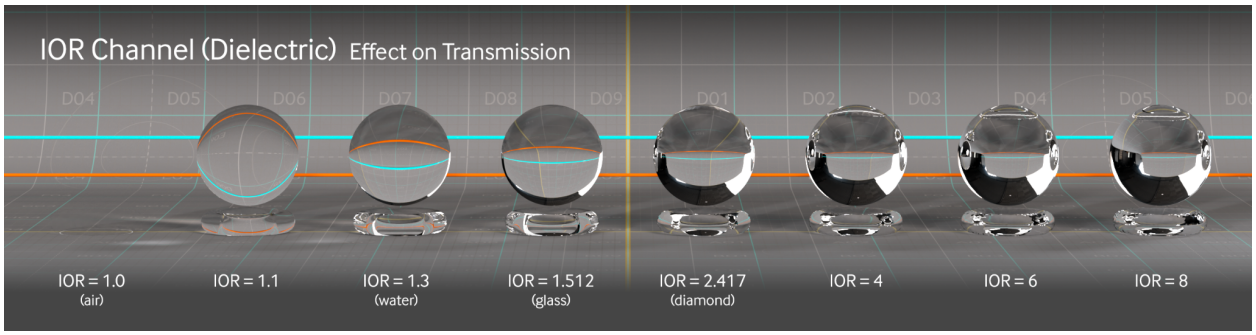
Hot Pixel Removal, also in the Camera Imager, helps a lot to get rid of fireflies (super bright pixels that cause 3D artists to cry when they see them).

PBR map: Emission

Advanced Material Property Channels

IOR (Dielectric) Channel





The IOR Channel (IOR stands for Index of Refraction, and is sometimes just called Index) is split into two sections. The top half (Dielectric) affects **both the Specular and Transmission channels**. The bottom half is for the Metallic channel (see next section).

There are good technical explanations out there, but as an artist, the effect is pretty much that the higher the IOR, the more the light bends and distorts as it travels through a Transmissive (glassy) object, and generally the shinier a glossy material's reflections look.

Because IOR affects both Specular and Transmission, It's a good idea to remove the Specular channel's contribution when you have a **transmissive** material like glass. This way you can control just how most of the light goes through glass without worrying about how some of it reflects off the surface. If you want a glass material that also has reflective properties, use the **Coating** channel which has its own IOR controls rather than Specular.

A realistic gas has an IOR of roughly 1, which doesn't really bend light (think of looking through clear air). Realistic fluids and solids tend to be between 1.3 and 2.5. Check this list or this list out and pick an IOR from there. Most realistic transmissive materials don't go above 2.5 (diamond).

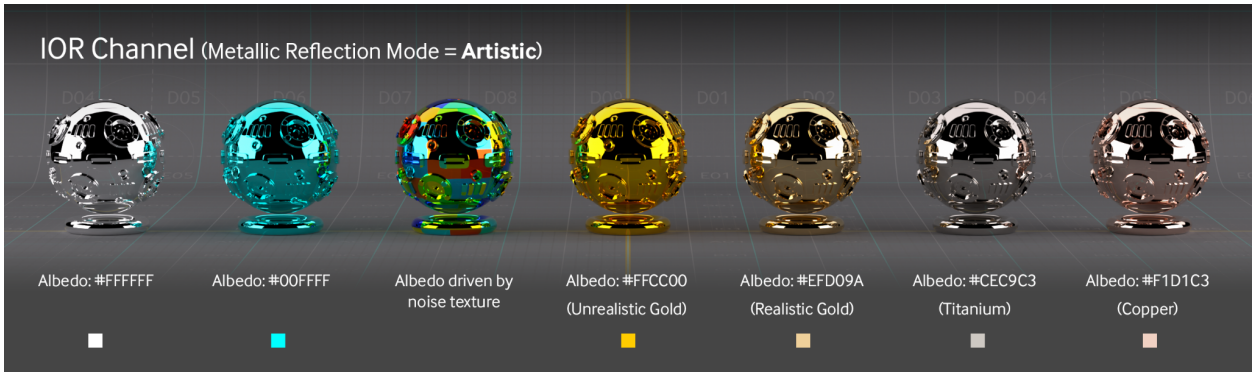
When creating a glossy, opaque material like plastic, Going above and IOR of ~3 starts to get into the realm of metals, and often it's a better idea to switch to a metallic material at that point.

PBR map: IOR or Index

IOR (Metallic) Channel

Metallic IOR is used to affect the properties of the Metallic channel. It has three different modes, all of which use different methods to tint and control how bright the reflections are. These modes are found under the **Metallic Reflection Mode dropdown**, and reveal different controls underneath them when selected.

Artistic Mode

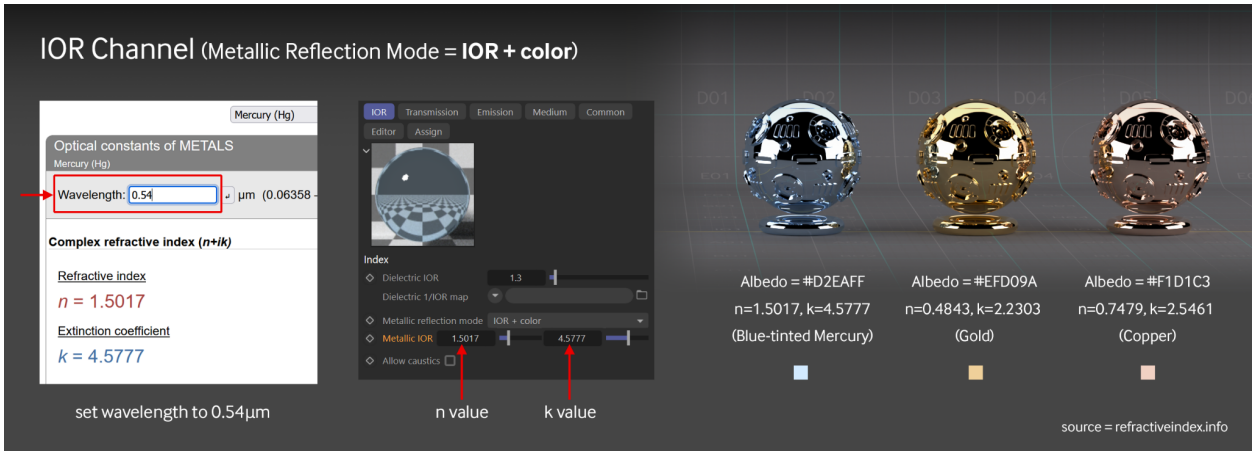


This is the easiest to use, and also default. None of the IOR input sliders work in this mode, so ignore them. You just color the material in the Albedo channel and you're good to go.

Note that if you're looking for a realistic color for the metal, the Albedo color will always be a LOT more washed out than you'd expect. Realistic gold, for instance, would be #EFD09A or H:38.1, S:35.6, V:93.7, instead of something like #FFCC00 like you may expect. physicallybased.info has a good set of colors for various metals - change the color representation on the site from 0-1 to 0-255 for RGB values, or HEX for hex values if you're using the C4D-native color picker.

The Edge Tint color in the Metallic channel will tint the edges in this mode.

Color+IOR mode



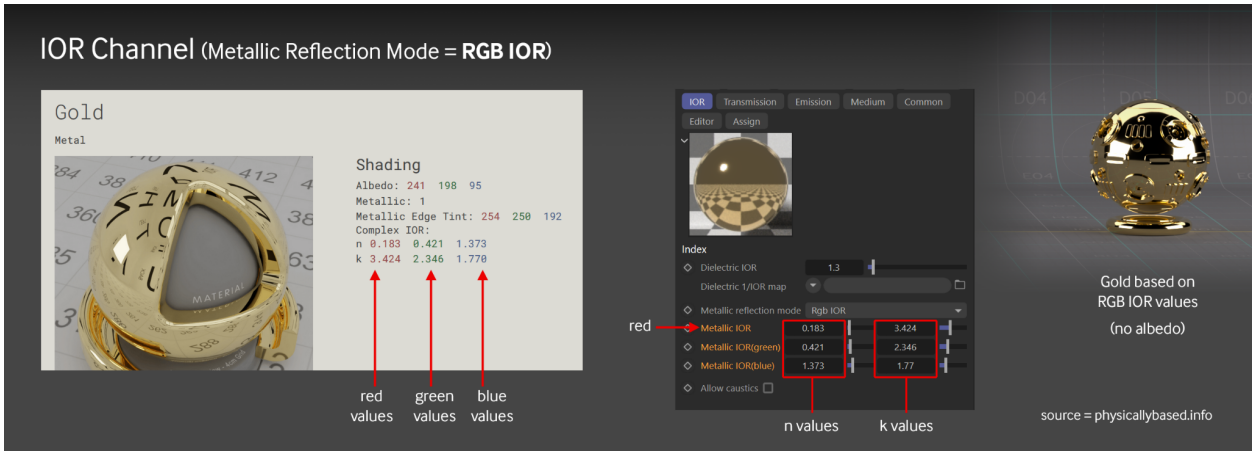
This still lets you change the color of the metal with the Albedo channel, but it controls the brightness of the reflections with real-world values. This mode uses a simplified two-value system where you only need an n (first field) and k (second field) value. This mode is good if you want to build a real world metal, but want to tint it a certain color.

If you want, say the reflective properties of Mercury, but with a blue tint, you'd choose IOR+color from the Metallic reflection mode menu, then go to refractiveindex.info and find the page for Mercury. Octane uses **0.54 µm** as the wavelength for this mode, so type 0.54 into the wavelength field on that site.

You'll see that the Refractive index (n) of Mercury is = 1.5017 @0.54µm, so put that in the first field of the Metallic IOR section of the IOR channel, and the Extinction coefficient (k) is = 5.3383, so put that in the second field to get the metallic properties of Mercury. You'd then choose a blue color (#d2eaff in this case) for Albedo.

Edge Tint in the Metallic channel also works in this mode.

RGB IOR mode



This is the most complex method for controlling metals. When set to this mode, the material will **ignore the Albedo color** and use the IOR's red, green, and blue n and k values to change the color of the metal in addition to controlling the brightness of the reflection.

Where do you get these six values? Fortunately, physicallybased.info is a fantastic resource that contains values for a ton of different materials. The key thing to remember here is that the first row in the Octane material (just says "metallic IOR") is actually the **RED** value. Green and blue are labeled accordingly. The first column is the n values, and the second is the k values.

If there's a metal that hasn't been converted that you need, you'll have to go to refractiveindex.info, find the metal you want, and then use **0.65µm** for the red n&k wavelength values (top field, not labeled "red"), **0.55µm** for the green values and **0.45µm** for blue.

We've already built Universal Material versions of many of the metals on the site using all three IOR types so you can see how they match up. You can download them here. You're welcome.

Edge Tint in the Metallic channel does NOT work with this mode.

BRDF

This is not a channel itself - the dropdown for it is found in the material's **Basic** tab (or at the top of the Material properties window in the node view).

This is often overlooked option, but very important, especially for roughness and anisotropy. BRDF stands for **B**idirectional **R**eflectance **D**istribution **F**unction, which is a fancy way of saying "how light reacts when it hits a surface".

Octane is the default model, which is pretty good for most material types. The only time this absolutely must be changed to one of the others is if you want to use anisotropy, since the default Octane model doesn't support it.

Beckmann is great for super reflective surfaces (very little roughness).

GGX is the go-to when roughness and anisotropy is involved. The new energy-preserving variant can save some render time, so it's always a good idea to pick that if you're using GGX.

STD is a new model (in Octane 2021.1+) that provides an extra control in the Roughness channel via the Spread parameter. By default it behaves like Beckmann, but the spread slider changes the look pretty drastically.

Roughness Channel

The Roughness channel makes reflections more or less rough. This affects reflection/refraction in the Metallic, Specular, and Transmissive channels (assuming Specular or Thin Wall Specular type Transmission - it has no effect on diffuse Transmission).

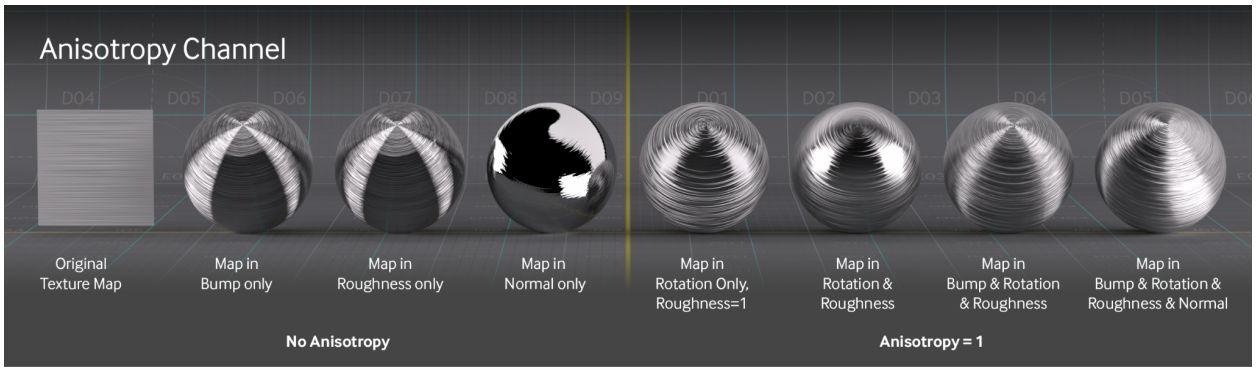
A little roughness goes a long way. The visual difference between low float values is much greater than higher float values, so always start really low (even 0.01 or 0.001) and work up incrementally. This also changes pretty dramatically when using GGX vs Octane's default BRDF.

If you choose STD as the BDRF, there's a Spread slider that changes how light scatters when it hits the surface.

Roughness can seriously beat on the GPU if you're using it with Specular type Transmission, so if your render times start going crazy, see if this is the culprit.

PBR map: Roughness or Glossiness (needs to be inverted)

Anisotropy Channel



The Anisotropy channel produces a special kind of directional reflective effect. It works really well on metal, but also works on specular type materials (Specular type Transmission and materials with contribution from the Specular channel itself). This channel builds on the Roughness channel.

It's most commonly seen in the real world in brushed metals, but there are other places it exists, like in hair and concrete.

The setup can get pretty frustrating since there are four steps needed to get this to work. if you miss any, nothing will happen and you'll be flinging sliders around and yelling at the monitor.

1. Most importantly, the material's **BRDF** type (Basic tab of the material) **must be set to GGX**, **Beckmann, or STD** - **NOT** the default Octane type BRDF. The Octane BRDF model doesn't support anisotropy, so it will just flat-out not work.

2. The **Anisotropy slider** in the Anisotropy channel needs to be set to a non-zero value (usually 1). It can also be set to a negative value if you want the effect reversed.

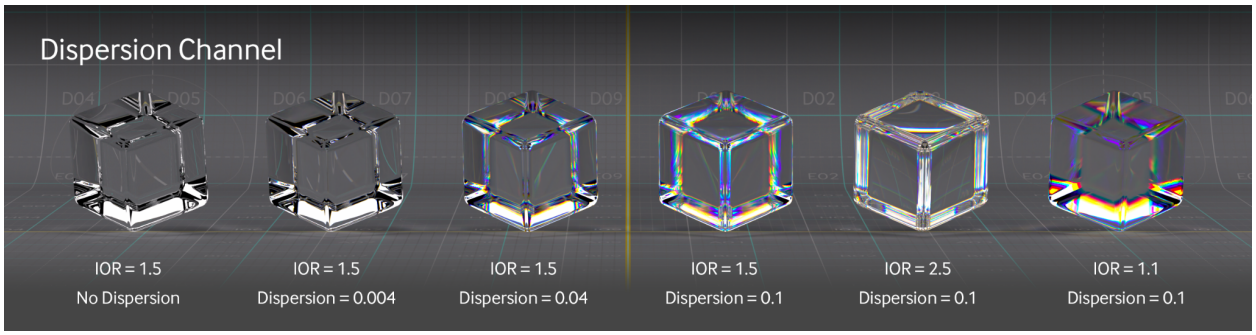
3. Some sort of input is needed in the **Roughness** channel, either by giving it a value like 0.5 (good place to start), or by using the same texture you're going to use in the Rotation input (next step).

4. Finally, a texture (image or procedural - it's not picky) needs to be used in the **Rotation** section of the Anisotropy channel. This controls how light scatters when it hits the surface.

The illustration at the top of this section shows what happens when you connect the same map (shown in on the square) into the channels noted below each shader ball. Piping it into a combination of Roughness, Rotation, Bump and Normal channels all produce different looks with varying levels of detail.

PBR map: Anisotropy and/or Rotation

Dispersion Channel



The Dispersion channel disperses the light (splits it into colors) in Transmissive materials. It's most obvious when using Specular type Transmission (see Transmission channel). The effect in Thin Wall and Diffuse is very minimal and usually not worth the render hit.

Dispersion is **very GPU-intensive**, so be careful when using it.

Octane uses Cauchy's equation for dispersion values. Values for real-world materials are often very, VERY low. Borosilicate glass, for example, is 0.0042. This will have a very subtle effect in a render (the 2nd cube from the left in the illustration shows this), so sometimes you'll need to boost it up a bit to get the look you want.

The look of Dispersion changes pretty drastically as the Dielectric IOR and geometry of the model change.

One other issue you may encounter is that high dispersion values (0.05-0.1) may cause hotspots or other artifacts depending on the lighting and geometry, so dial it back if you start to see that.

PBR map: None

Medium Channel

The Medium channel produces a volumetric area inside of an object and controls the scattering and absorption of light inside of that area. In order for this to work, the material needs to be **Transmissive**. Real world scale of your geometry is also very important for getting accurate results with mediums.

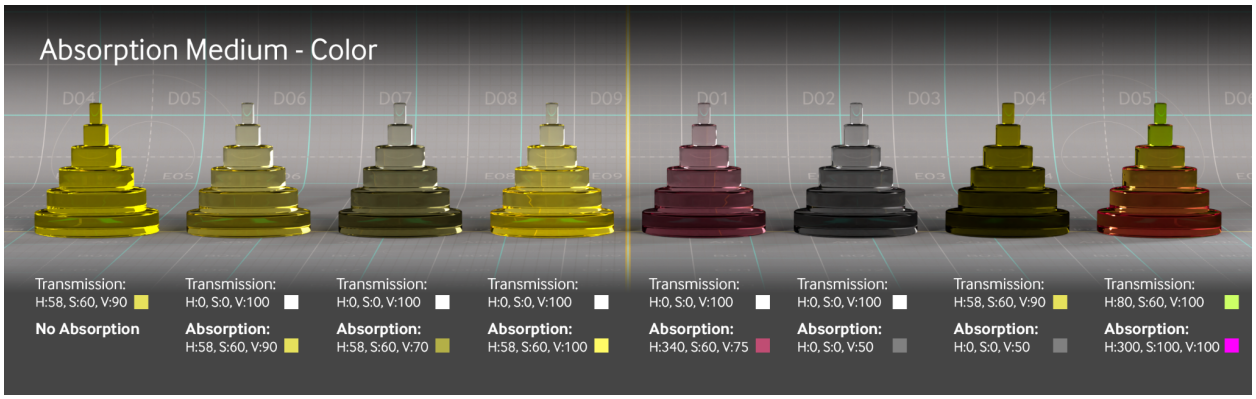
This does not control or affect VDB volumes - that's a whole separate topic with a whole separate guide

The Medium channel needs one of three Medium nodes hooked up to it to work (Absorption, Scattering, or Random Walk). There are three shortcut buttons in the channel's UI that add these, or they can be added manually in the node editor.

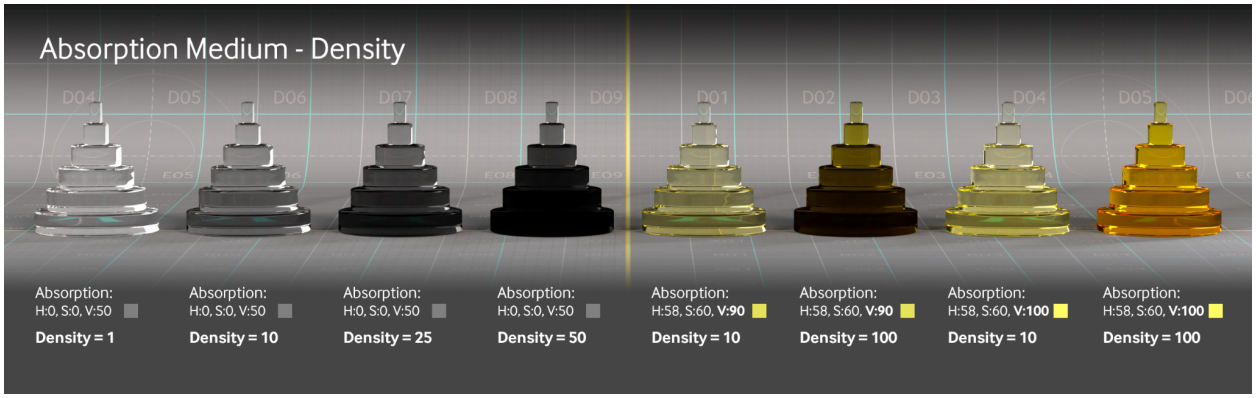
Absorption Medium

As white light travels through an absorption medium (mostly liquids in the real world), several of the wavelengths (colors) that make it up are absorbed, and the ones that make it through give the object its color.

Absorption is most apparent when used with **Specular** type Transmission. It will work with Diffuse Transmission, but the density usually will have to be relatively low, and the lighting will have to be just right to see the effects well.



Absorption Color
Make sure the Transmission color is set to white at first, and then add a color to the absorption medium. Once you're comfortable with the effects of absorption, you can play with adding Transmission color in to get some interesting looks.

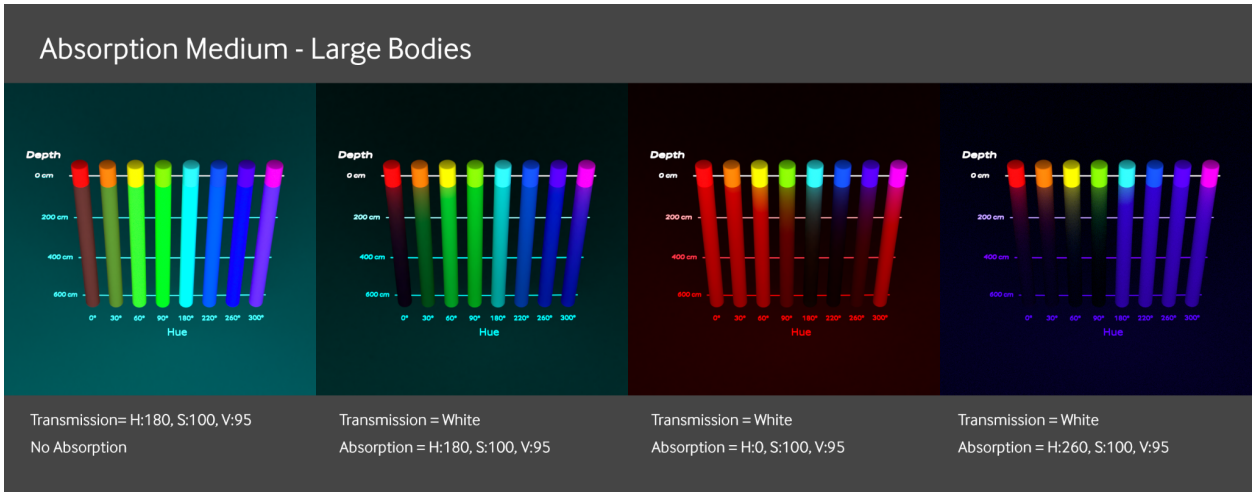


Absorption Density
This changes how dense the material is, and therefore how quickly light absorbs in it. This setting will depend a lot on the thickness of your geometry. It also depends on the absorption color - darker colors will often need less density than brighter ones when applied to the same object. **Absorption colors with the Value (V) set to 100% are very**

hard to make look dense, even at extremely high values. If you're after a realistic material, dial this back to 95% at first and go from there.

Inverting Absorption

Technically, the proper absorption color for the cooking oil above would be the **complementary** color of orangey-yellow, which is a purply-blue. Because nobody wants to sit there with a color wheel, there's an option in this medium to **invert absorption** color (on by default). This is usually the preferred way for artists to work with it - if you want the material to look yellow, you just pick a yellow with this option checked. Uncheck this if you have a physically-accurate absorption color for your material.



Absorption in large bodies

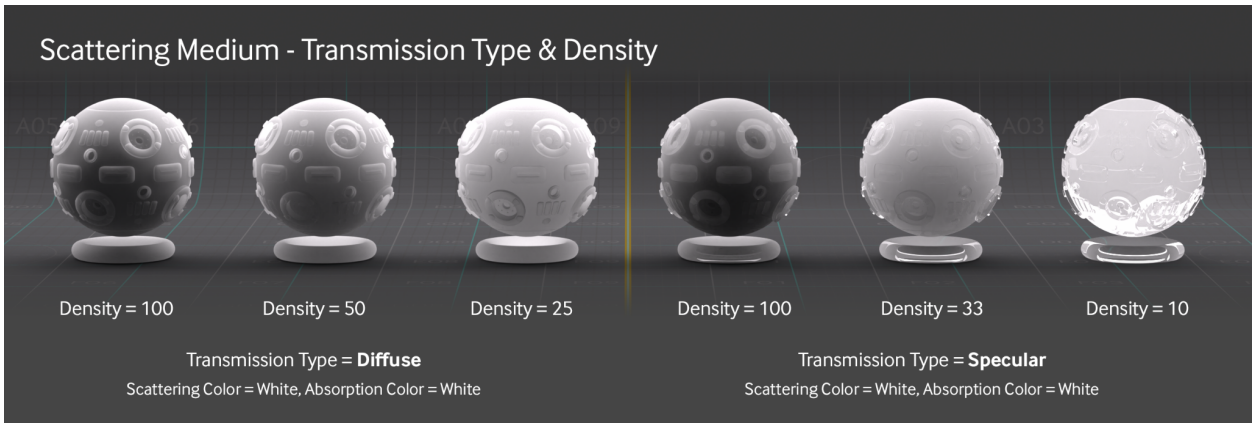
In larger bodies of fluids like bathtubs and oceans, you can really start to see the difference in realism between water with a tinted Transmission color vs one with Absorption. You can also see the effect different absorption colors have on objects with different Albedo colors when they're embedded in an object with an Absorption medium.

Scattering Medium

With this medium applied, as light passes through an object, the rays scatter and bounce around, and it creates a cloudy/milky, semi-transparent effect. This is known as Subsurface Scattering in a lot of programs.

This effect is really finicky and time consuming to get right. It's very GPU-intensive which makes iteration times slower. When trying to dial in the look, keep the samples fairly low (256 or 512) and use the Denoiser. Once you're happy with the look, up the samples until it's clean.

The color and look of a material with scattering is a delicate balancing act between the Scattering color in the Medium, the Absorption Color in the Scattering Medium, the density, the lighting, the Transmission type (specular or diffuse), the Transmission Color, and the size/shape of the object the material is being applied to. This is assuming Albedo/Specular/Metallic is all set to have no contribution.



Transmission Type & Density

Scattering works with both Diffuse and Specular type Transmission, but with far different results.

Diffuse transmission with scattering is well suited for plastics and other semi transparent solids. It's usually better with higher Density settings in the Scattering node.

Specular transmission with scattering is harder on the GPU (takes more samples for a clean result), but is great for cloudy liquids like milk, or semi transparent gems or minerals like jade. Density usually needs to be quite a bit lower to get good results with this mode. Specular transmission will also be affected by Dielectric IOR in the IOR channel.

Scattering Color

The color assigned to the Scattering input determines which wavelengths (color components) of light will scatter, and which will pass straight through. If it's set to white, all of the wavelengths will bounce equally and the object will just look darker on the side opposite of where the light source is shining.

If it's set to a color, that color's wavelengths will bounce around and be visible where the light is shining, but once it makes it through the other side (depending on density), all that will be left is the complementary (opposite) color of the one you chose.

Scattering + Absorption

There is also an Absorption input in the Scattering node. This works the same as the Absorption Medium, and can work in conjunction with the Scattering color to determine which colors are let through on the other side.

In the example above, just putting a blue color in Scattering produces a murky orangey red color on the other side after all the blue bounces around and dissipates.

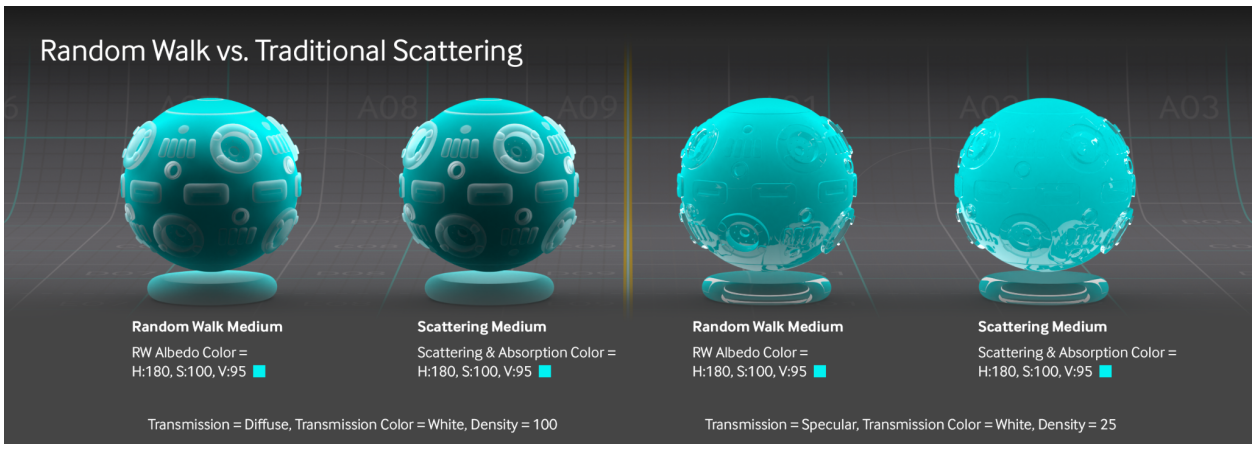
When the same color is also put into the Absorption input, all of the orangey red is absorbed up front, so the blue is still visible through the object. When a slightly darker

version of the blue is put in Absorption, it absorbs more light as it goes through and the overall effect is darker.

When white is used in Absorption, the blue color is absorbed up front, and as the light goes deeper and splits and bounces more, and the complementary orangey-red color is all that's left.

Emission
There's also an Emission input which adds light emitting properties to the scattering. This will be explored more in the deep dive guide.

Random Walk Medium



Random Walk is a newer medium that also scatters light, but uses a different algorithm than the Scattering Medium and has different controls.

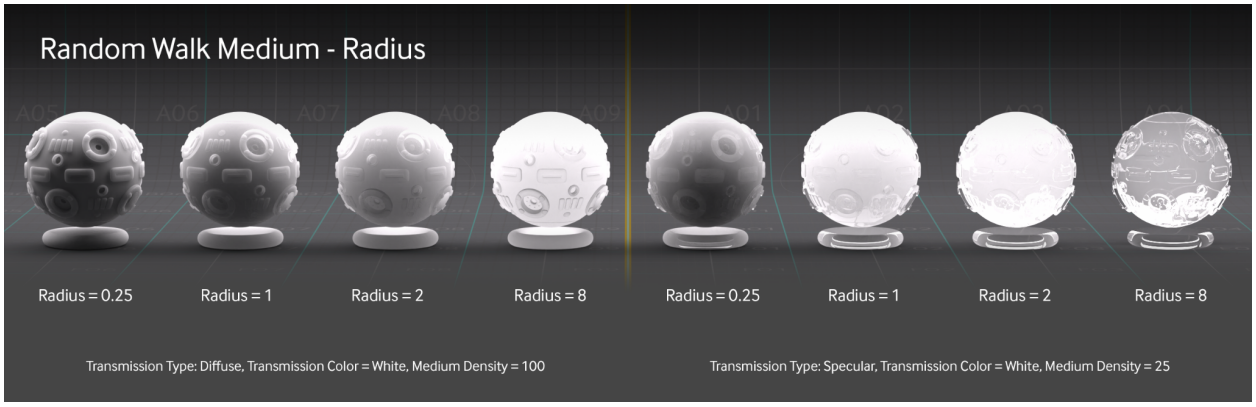
The difference ranges from subtle to more pronounced depending on the geometry, colors and lighting. Above, you can see that Random Walk when used with Diffuse Transmission produces a softer blend between the more and less dense areas. When used with Specular Transmission, in this case Random Walk preserved the surface details better when used with similar settings.

Random Walk is especially good for skin and other organic semi-transparent materials.

Albedo Color
This is completely different from the Universal Material's dedicated Albedo channel, so in the illustrations we refer to it as **RW Albedo**.

Any color you place in the Random Walk Medium's Albedo channel will determine the color of the scattering effect, but unlike the Scattering Medium, it will not produce the complementary color on the other side of the light source, so there's no need to counter it with Absorption (in fact, there is no Absorption in the Random Walk node).

Density
This works the same as the Scattering Medium (see above). This controls the overall density of the medium which lets more or less light through which in turn makes the object appear lighter or darker and changes the appearance of the material.



Radius
Radius works hand in hand with Density to control how solid the material feels. This setting refers to how deep into the geometry the effect goes. Unlike Density, Radius is HIGHLY dependent on the size and makeup of the geometry of the object the material is being applied to. This setting will have to be tweaked with every new object you place the material on.

In the example above, the spherical part of the shaderball has a radius of 8cm. This means when the Random Walk radius is 8 or greater, the scattering effect will be very, very minimal, and at higher values won't even be noticeable.

Radius Color

The Radius setting also has an input that you can put a texture into. Putting a solid color into this field works similarly to Absorption in the Scattering medium. When all of the main color is scattered away after light enters the object, what's left is the radius color you specify.

Once a color is fed in, the radius value in cm is no longer able to be set, so Density will be the main control for the… well… density of the effect.

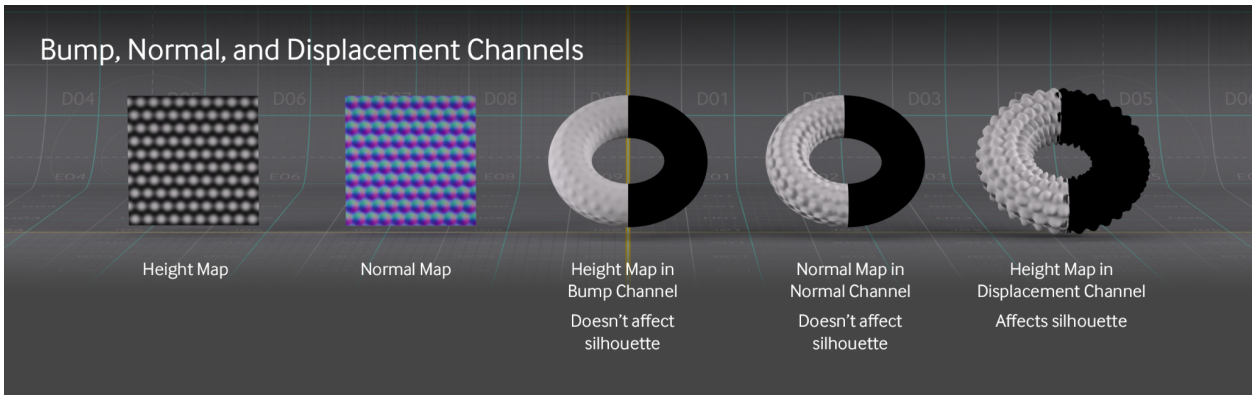
Image textures and gradients can be fed in here for interesting effects as well.

PBR map: Scattering, SSS

Surface Depth Channels

These channels add extra detail to the surface of the object.

Bump, Normal, & Displacement Channels



Both Bump and Displacement use the same map (usually called a Height map). Normal uses a GL Normal map (not a DX one), which is easily recognizable by its blue/purple/green appearance.

Bump and **Normal** create a "fake" bumpiness effect which does not affect the silhouette of the geometry, and is very easy on the GPU. A full rundown on Normal maps and how they compare to Bump can be found here. These two channels are best for small details on a surface that don't need to hold up to macro scrutiny.

Displacement actually pushes the geometry in or out which does affect the silhouette, but is much more GPU intensive than either Bump or Normal. This is used for adding a lot of extra detail to a model which still looks good up close.

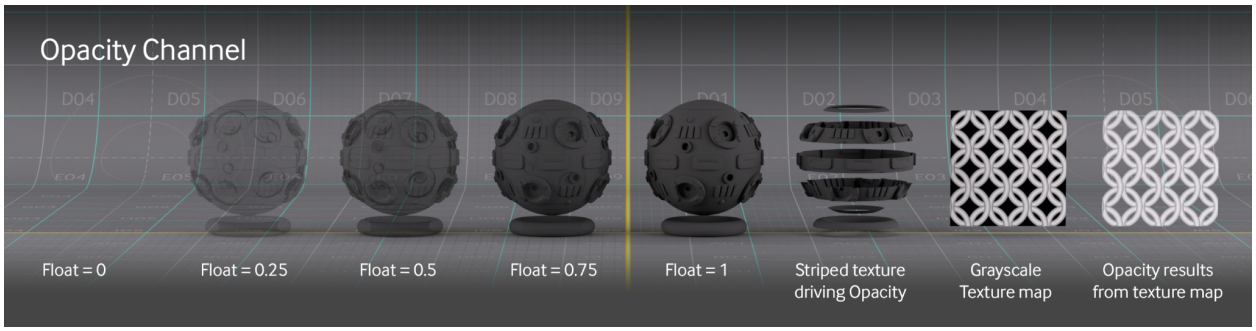
Displacement is tricky and is dependent on a lot of things to work properly. Two entire guides have been written just go over this (part I here, part II here), and there was even a need for a dedicated guide on troubleshooting displacement.

PBR map: Height (for Bump and Displacement), Normal

Special Effect Channels

These channels work independently of the other channels to produce specific effects.

Opacity Channel



The Opacity Channel works similarly to the Opacity slider in Photoshop. This is **very** different from Transmission and isn't used to create glass or translucent materials.

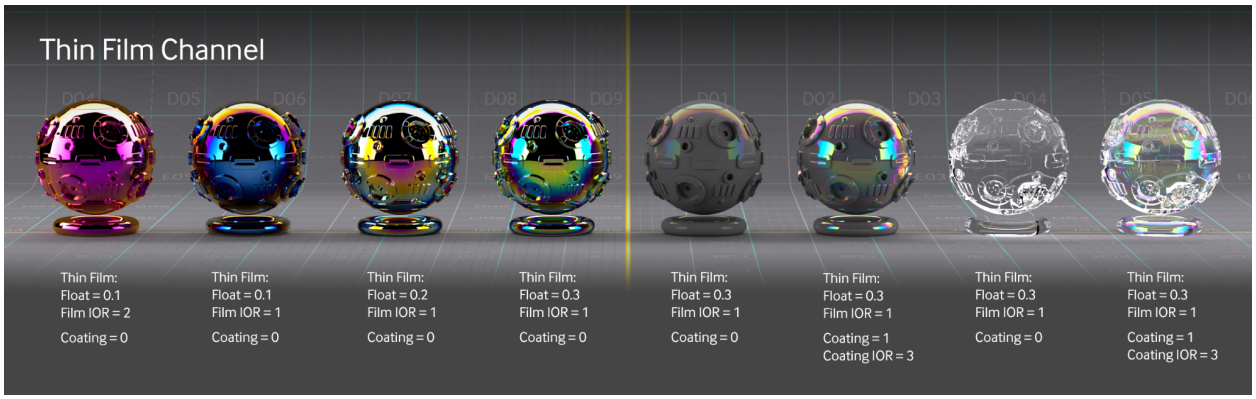
The 0-1 float slider adjusts the opacity of the entire object. This is good for a hologram or a fade transition. Unlike Photoshop, you start seeing the back side of the object through the front side as you reduce the opacity, so there are some interesting effects that can happen here.

If you run a texture into the opacity channel, you can punch holes in materials meant for thin objects like paper, fabric, or a decal. This isn't great for 3D geometry as seen above, unless the goal is to make sliced ribbons or something like that.

When a texture is used in the Opacity channel, black pixels in the texture become 100% transparent in the material, and white pixels become 100% opaque. Grays fall between, making semi transparent portions of the object.

PBR map: Opacity or reversed Transparency

Thin Film Channel



The Thin Film Layer channel puts an iridescent oily sheen on the object. The more reflective (higher IOR) the material, the more obvious the effect. Because of this, it works exceptionally well with metallic materials.

For non-metallic materials, combining Thin Film with the **Coating** channel really helps it pop out, as seen above on the right.

In the case of a glossy opaque material, the Specular channel with a low IOR (1.3) gives a weak Thin Film effect. While the IOR could be punched up to 2 or 3 to enhance the effect, it would also change the other specular properties of the reflections. Adding a Coating layer with an IOR between 2 and 3 makes it really punchy and allows you to control the effect separately from the specular channel.

Thin Film doesn't affect Transmission. If you want this effect on glass, you either need to add Specular channel contribution or a Coating layer. The IOR channel controls both the Specular and Transmission, so most times you'll need too high of IOR to make the thin film effect apparent, and that will make glass' refraction look like diamond. Again, the Coating layer would be a better option here because it has a separate IOR control so you can enhance the thin film effect without changing the refraction properties of the glass.

The coloring of this effect is a little hard to art direct, but what it essentially comes down to is playing with both the channel's **Film IOR** and **Float** sliders (leave the color input at 0,0,0).

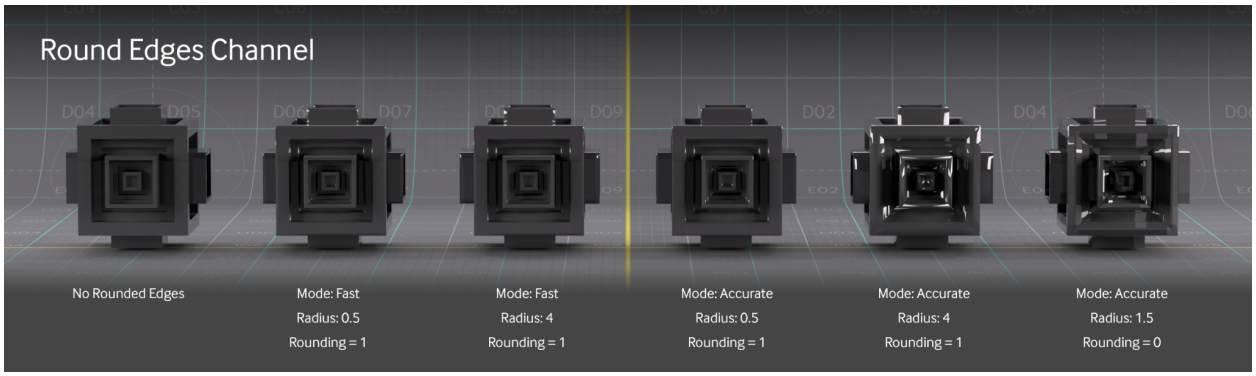
Film IOR controls how spread out the colors are, with 1 having a tight radial pattern toward the edges of the geometry and higher than that showing fewer of the colors in the spectrum.

Float cycles through the colors. The higher both of these numbers, usually the less pronounced the overall effect is.

Typically the rounder the object, or more the points on the surface vary in the geometry, the more colorful this effect will be.

PBR map: Film Width

Round Edges Channel



This channel rounds sharp edges of the geometry at render time. It's a quick and dirty way to make geometry look a little better without having to spend time editing the mesh.

It's similar to a bump or normal map where it doesn't alter the silhouette of the object though, so it's best for geometry that just has some sharp internal corners, or small bevels that catch specular highlights.

This channel is **hidden** by default, and needs to be enabled by going to the Basic tab of the material and checking the box next to the channel name.

Fast mode is good for adding just a touch of bevel to sharp edges to bring out highlights. Accurate mode looks better, and is needed for higher values.

Top Layer Channels

Coating, Sheen and Material Layer all go on top of everything else, and can be used with any combination of the channels covered already.

Coating Channel

The Coating channel puts a glossy specular layer **over the top of the material**. This is extremely useful, because it can be used to give a material some extra gloss or enhance a thin film effect **without affecting the other properties of the material**. It's also great for a clearcoat on top of automotive paint.

Coating has a few options - Amount (float), Roughness, and IOR.

Amount is just a 0-1 scale that changes the intensity of the effect. 0 is no effect (or off), 1 is full.

Roughness controls the roughness of the coating layer (different than the Roughness channel).

IOR controls the look of the reflections for the coating. 8 is super shiny like chrome. 1.5 is similar to glass. **This is separate from the dedicated IOR channel**. The controls here do not affect how light passes through a transmissive material in the Transmissive channel, or the material's Specular channel.

PBR map: Coating or Clear Coat, Coating Roughness, Coating Bump, Coating Normal

Sheen Channel

The Sheen channel produces a satin-type finish over the top of the material.

It works best with a matte type material like cloth or paper. Sheen can be added to metallic or specular type materials as well, but often it'll be overpowered by specular reflections in those types of materials.

The sheen Roughness slider affects how spread out the effect is. 0 will produce a sharp rim light effect, while 1 will create almost a rough metal look. Usually starting around 0.25-0.4 works best.

A bump or normal map can also be added to the sheen to break it up.

PBR map: Sheen, Sheen Roughness, Sheen Bump, Sheen Normal

Material Layer

The Universal Material supports **Material Layers**, which allow for composite materials (glass mixed with metal, or glossy mixed with emissive) without needing to use Octane's Mix, Composite, or Layered type material. This is way too complex of a topic to go into here, and it requires knowledge of mixing and masking. More on this can be found in [this guide]().

Wrap Up

So... that was a lot. Hopefully you've learned a ton about what all the various channels in the Universal Material do. There are several other material-related guides linked below to continue your studies.

Other Material-related Guides

🌐 Basics: Universal Material Build Guide: 10 questions that will help you determine how to build any Universal Material.

🌐 Universal Material Starter Kit: 75+ Materials to help you understand and build your own Universal Materials

🌐 Intermediate: Normal Maps : Deep dive into the Normal channel, also covers bump

🌐 Intermediate: Mixing and Layering Deep Dive : Deep dive into mixing and layering nodes and materials

🌐 Intermediate: Mixing and Layering Stepthrough : Project-based approach to learning how to mix and layer materials

🌐 Advanced: Displacement - Overview : Intro to Displacement

🌐 Advanced: Displacement - Model Considerations : How to set up topology for good Displacement

🌐 Advanced: Displacement Troubleshooting : How to fix common issues with Displacement

🌐 Advanced: Volumetrics Overview : Introduction to Volumetrics - first half covers scattering and absorption mediums

Author Notes

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