

# CG COMPOSITING SERIES

2.4 - Material AOVs  
Albedos & RAW Lighting





# CG COMPOSITING SERIES

## Material AOVs

Simple	Intermediate	Complex
Diffuse	Direct Diffuse + Indirect Diffuse SubSurface Scattering (SSS)	RAW Diffuse Lighting Albedo / Texture / Color map
Specular	Direct Specular + Indirect Specular Reflection, Coat, Sheen	RAW Specular RAW Reflection Specular Filter
Emission		→
* Reflections + Refractions		→



# CG COMPOSITING SERIES

## Material AOVs

Simple

### Diffuse

Intermediate

- **Direct Diffuse**
- **Indirect Diffuse**
- **SubSurface Scattering (SSS)**

Complex

- **Raw Diffuse Lighting**
- **Texture / Color / Albedo**

Simple

### Specular

Intermediate

- **Direct Specular**
- **Indirect Specular**
- **Coat** \*Additional Arnold Passes
- **Sheen**

Complex

- **Raw Specular Reflection**
- **Specular Filter**

Simple

### Emission

Simple

### Other / Exceptions

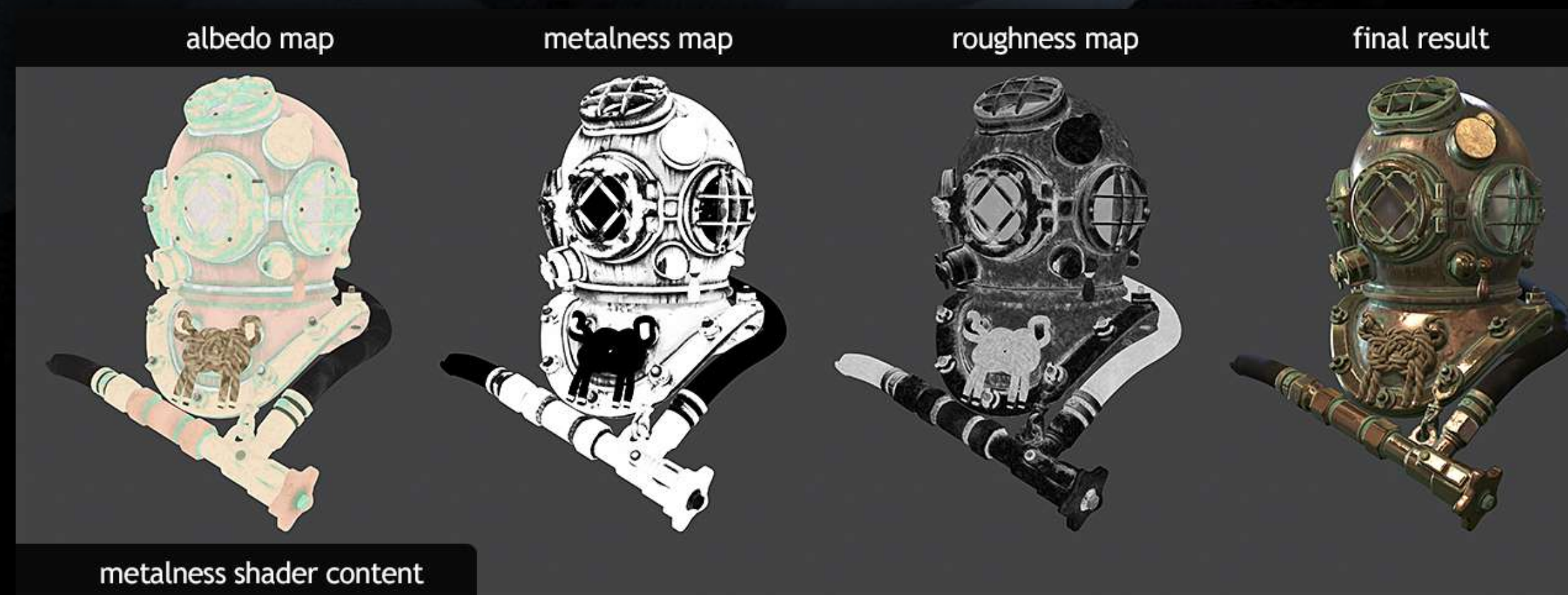
- **True Reflection**
- **Refraction**



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## What is Albedo?

- An **Albedo Map** is the base color or texture map that defines either the **diffuse color** or specular tint of the surface.
- Remember that in **Physically Based Rendering (PBR)** depending on whether a material is **Metallic** or **Dielectric (non metallic)**, determines whether the albedo color is used as **Diffuse Color** or **Specular Color**.
- It knows what to use the **albedo** for based off of a black and white **metallic map**



<https://meshlogic.github.io/posts/blender/materials/nodes-pbr-basic-shader/>



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## What's the difference between Albedo and Diffuse?

- **Diffuse** contains lighting and shading information such as **highlights**, **shadow** and light color. It's object's color / texture in the lit scene.
- An **Albedo Map** is basically the object's texture as it would appear under uniform lighting, without the influence of **shadows** or **highlights**.



Texture  
Map

<https://www.cgdirector.com/albedo-map/>



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Diffuse



Albedo

Render  
Pass



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## Other Names for Albedo

- Texture
- Color
- Base Color
- Diffuse Map
- RAW Diffuse Color
- Diffuse Filter

Common terms:

- “Map”
- “Filter”



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## What is RAW Lighting?

- **RAW Lighting** is the pure lighting information of the scene, without any specular, object colors, or textures.
- A pass that describes how **light** is affecting in the scene.
- This **multiplied** with the **Albedo** makes up the **Diffuse Pass**.



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## Why are they Important?

- **RAW Lighting** and **Albedo** are used together to produce the **Diffuse Pass**.
- One is a **Texture** or material color. The other is **Lighting** info. Together they represent a “lit texture”
- **Albedo** shows the true intended color of the object material. **RAW Lighting** shows the true colors and intensities of the scene’s lighting conditions.
- Together they show how that object and material would look in that lighting situation



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## Math Mantras

- Anything multiplied by 1 is itself. Anything multiplied by 1 stays the same, is unaffected.
- Anything multiplied by 0 is 0. We do not see anything that is 0, it becomes black or Null.

$$x * 1 = x$$

$$x * 0 = 0$$



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How are they combined?

Always multiplied together, not plussed

Diffuse = Albedo \* RAW Lighting



Diffuse

=



Albedo

X



RAW Lighting



# CG COMPOSITING SERIES

What is RAW Specular & Specular Filter?

Specular = RAW Specular \* Specular Filter



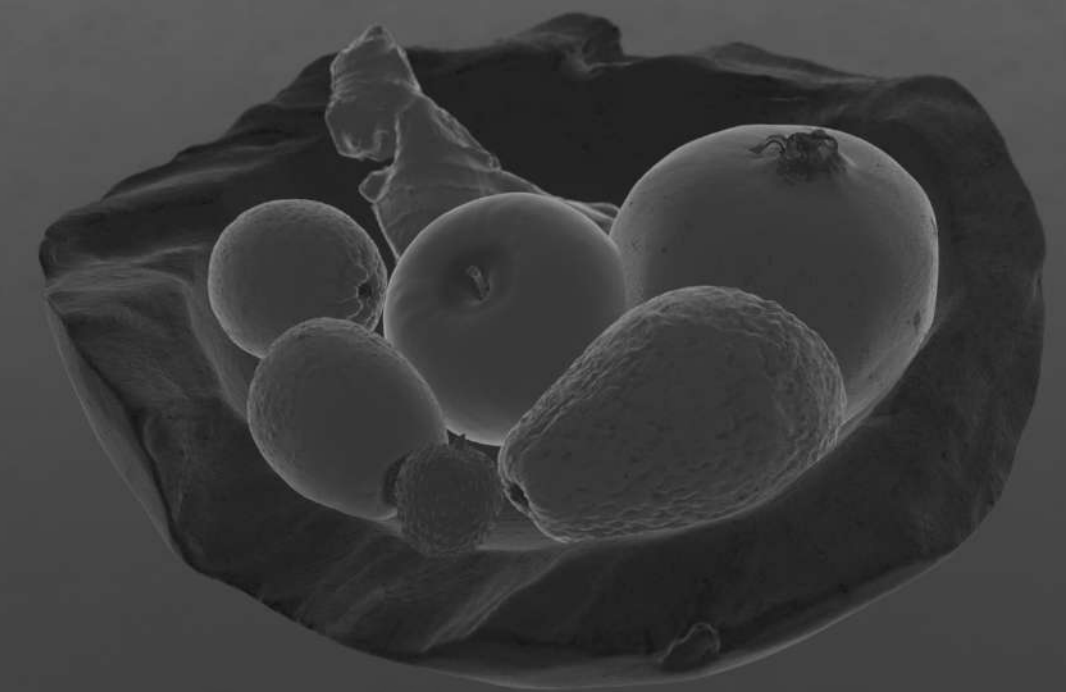
Specular

=



RAW Specular

X



Specular Filter



# CG COMPOSITING SERIES

What is RAW Reflection & Reflection Filter?

Reflection = RAW Reflection \* Reflection Filter



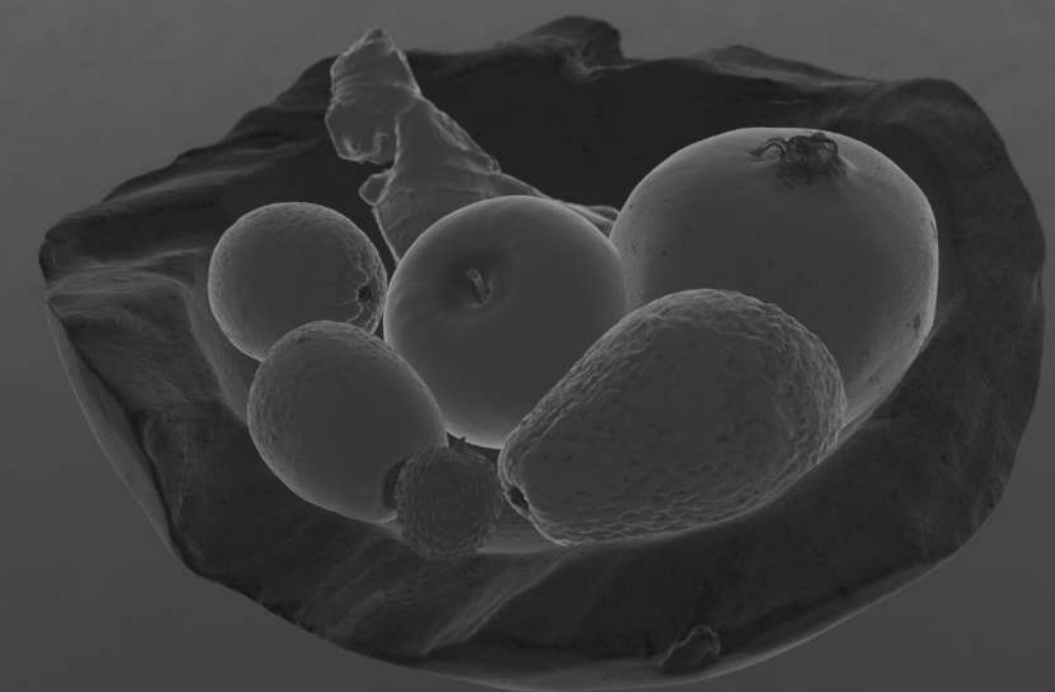
Reflection

=



RAW Reflection

X



Reflection Filter

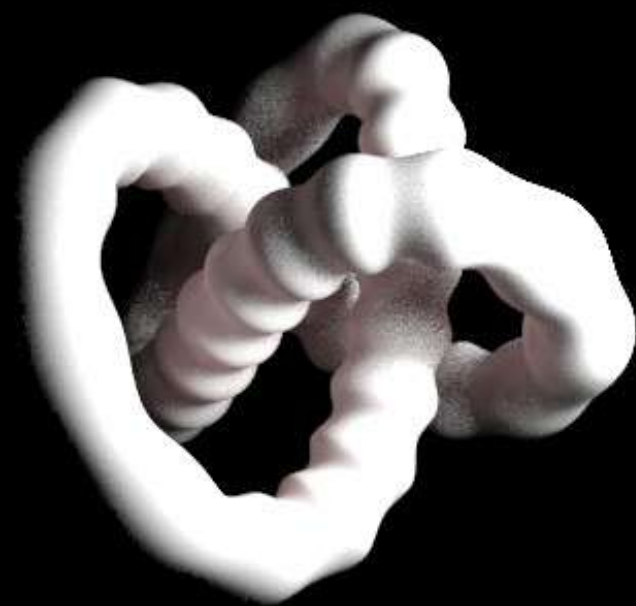


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## RAW Direct Diffuse & RAW Indirect Diffuse

Total RAW Diffuse = RAW Direct Diffuse + RAW Indirect Diffuse

For our purposes, if I use just RAW Diffuse, I am referring to Total RAW Diffuse, direct+indirect combined.



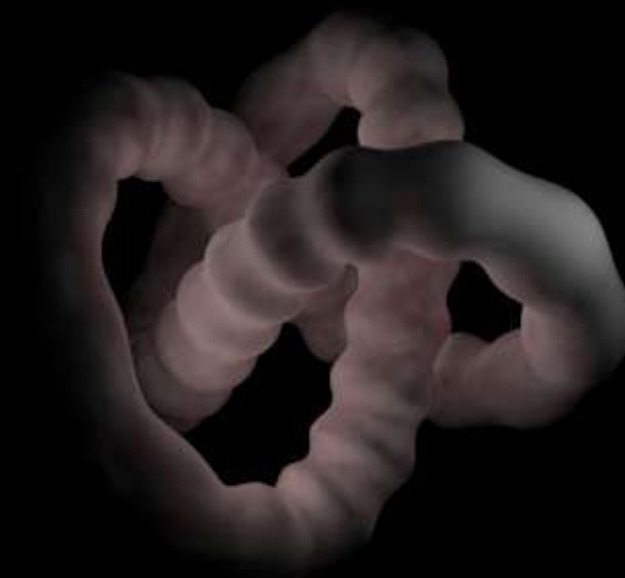
Total RAW Diffuse

=



RAW Direct Diffuse

+



RAW Indirect Diffuse



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## RAW Direct Specular & RAW Indirect Specular

Total RAW Specular = RAW Direct Specular + RAW Indirect Specular

For our purposes, if I use just RAW Specular, I am referring to Total RAW Specular, direct+indirect combined.



Total RAW Specular

=



RAW Direct Specular

+



RAW Indirect Specular



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## Math Class

$x = \text{Albedo}$

$y = \text{RAW Light}$

$\text{Diffuse} = (\text{Albedo} * \text{RAW Light})$

$\text{Diffuse} = (x * y)$



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## Math Class

These math operations reverse or “undo” each other

Addition  Subtraction

Multiplication  Division

$$(x + y) - y = x$$

$$(x * y) \div y = x$$



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## Math Class

$x = \text{Albedo}$

$y = \text{RAW Light}$

$\text{Diffuse} = (x * y)$

$$(x * y) \div y = x$$

$$(x * y) \div x = y$$

$\text{Diffuse} \div \text{RAW Light} = \text{Albedo}$

$\text{Diffuse} \div \text{Albedo} = \text{RAW Light}$



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## Math Class: Division

- 0 divided by any number is still 0.
- You **CANNOT** Divide by 0. A number divided by 0 is not 0, it is **undefined**.

The question: How many times does 0 go into any given number? How many 0's go into 4? Is Impossible to Answer.

$$0 \div x = 0$$

$$x \div 0 = \textit{undefined}$$



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## Multiply / Divide

- Think of **Multiply** like combining, fusing, mixing, linking, joining, locking
- Think of **Divide** like separating, splitting, unlinking, disjoining, unlocking





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## Separate - Change - Recombine

- Start with the combined pass
- Separate with **division**
- Change individual component
- Recombine with **multiplication**

