



SIGGRAPH 2023
LOS ANGELES+ 6-10 AUG

K H R O N O S
GROUP



Exploring the Artistic Frontier: Unleashing Creativity in 3D Models with glTF and PBR

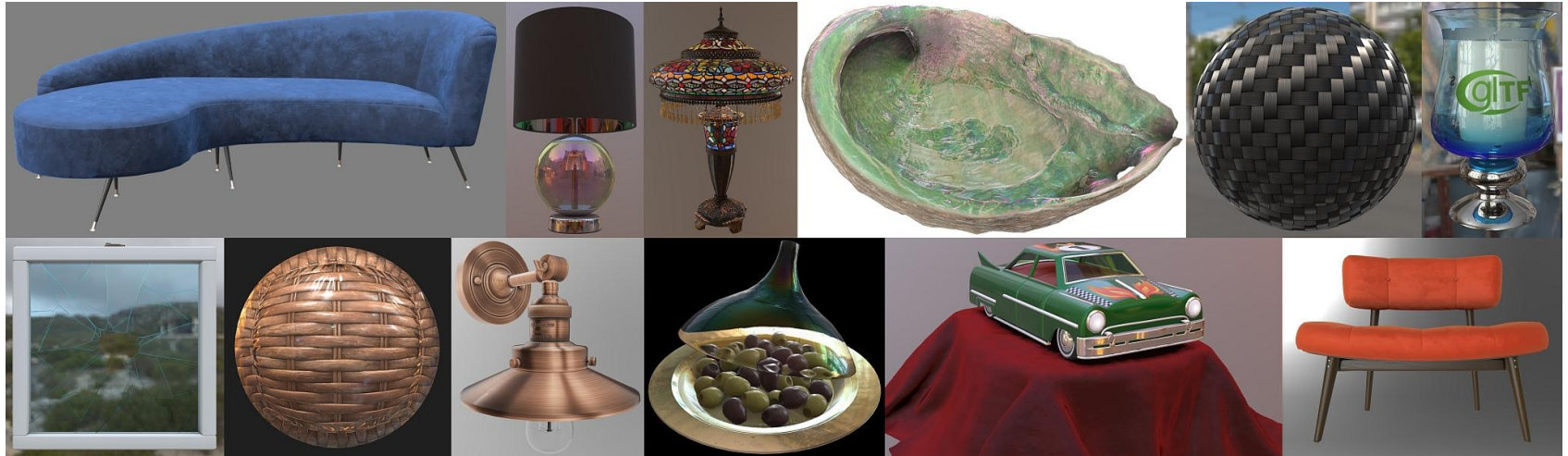
Eric Chadwick, Wayfair
echadwick@wayfair.com



Eric Chadwick, Staff Technical Artist, Wayfair

echadwick@wayfair.com

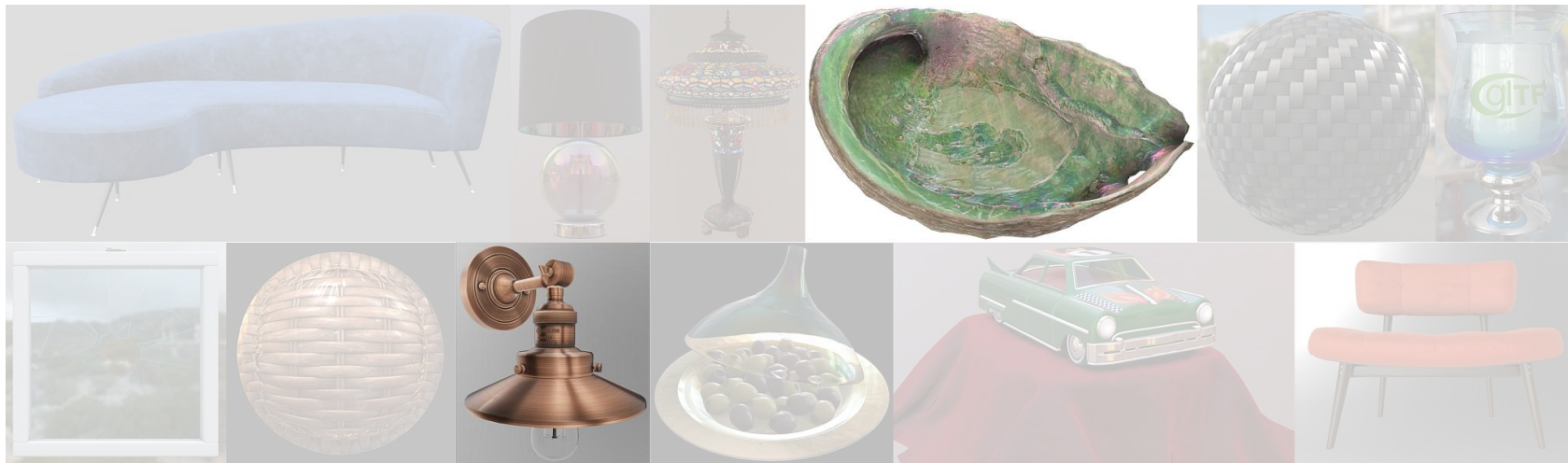
- 6 years at Wayfair
- Workflow improvements for 3D rendering and interactivity
- 20 years in game development
- Polycount admin, [forum](#) + [wiki](#)



Eric Chadwick, Staff Technical Artist, Wayfair

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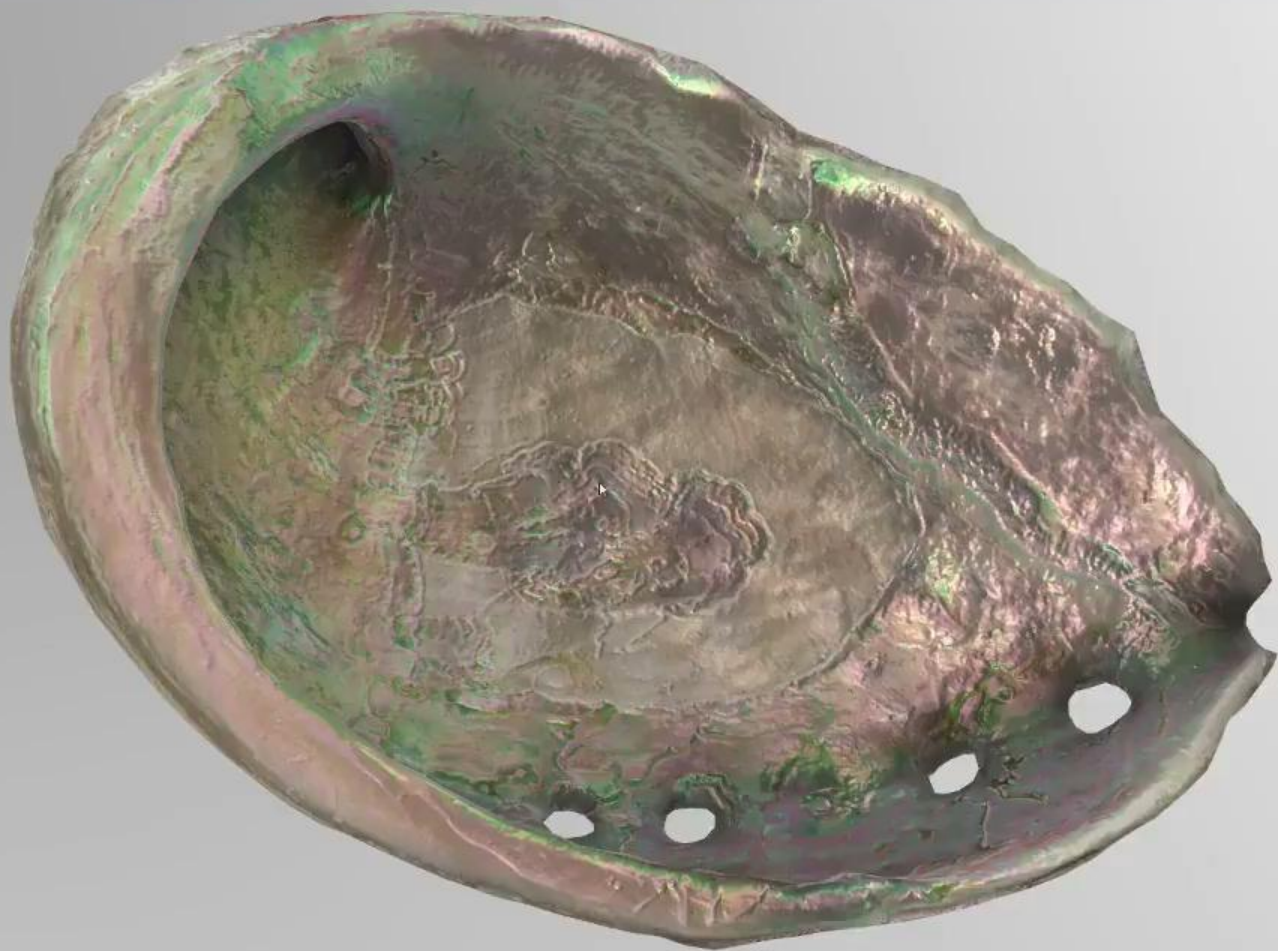
- 6 years at Wayfair
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- Polycount admin, [forum](#) + [wiki](#)



Khronos Group for open source standards, including glTF

Weekly conference calls: glTF features, interop, extensions, workflow, tooling, tutorials ...





Models

Models

IridescenceAbalone

Flavor

glb

Scenes

0

Cameras

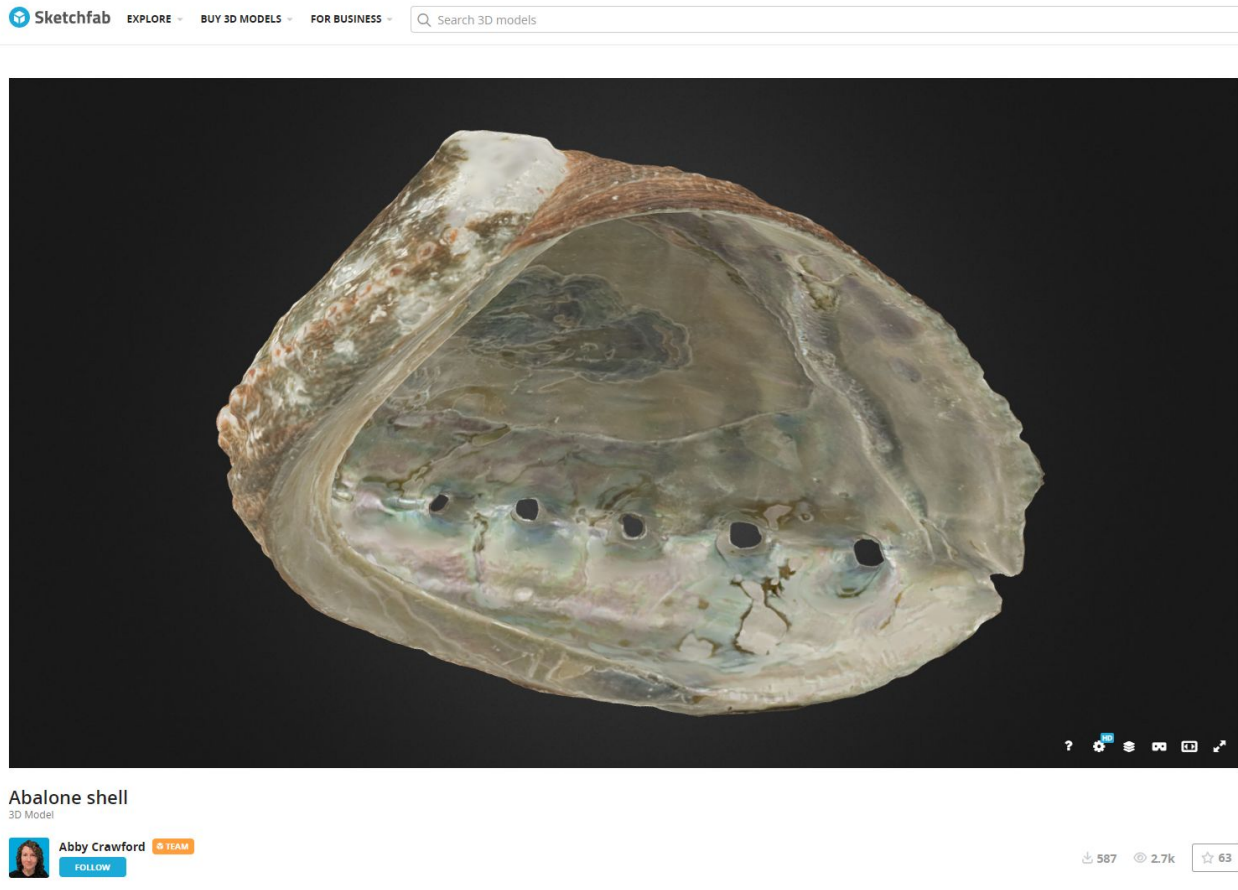
User Camera

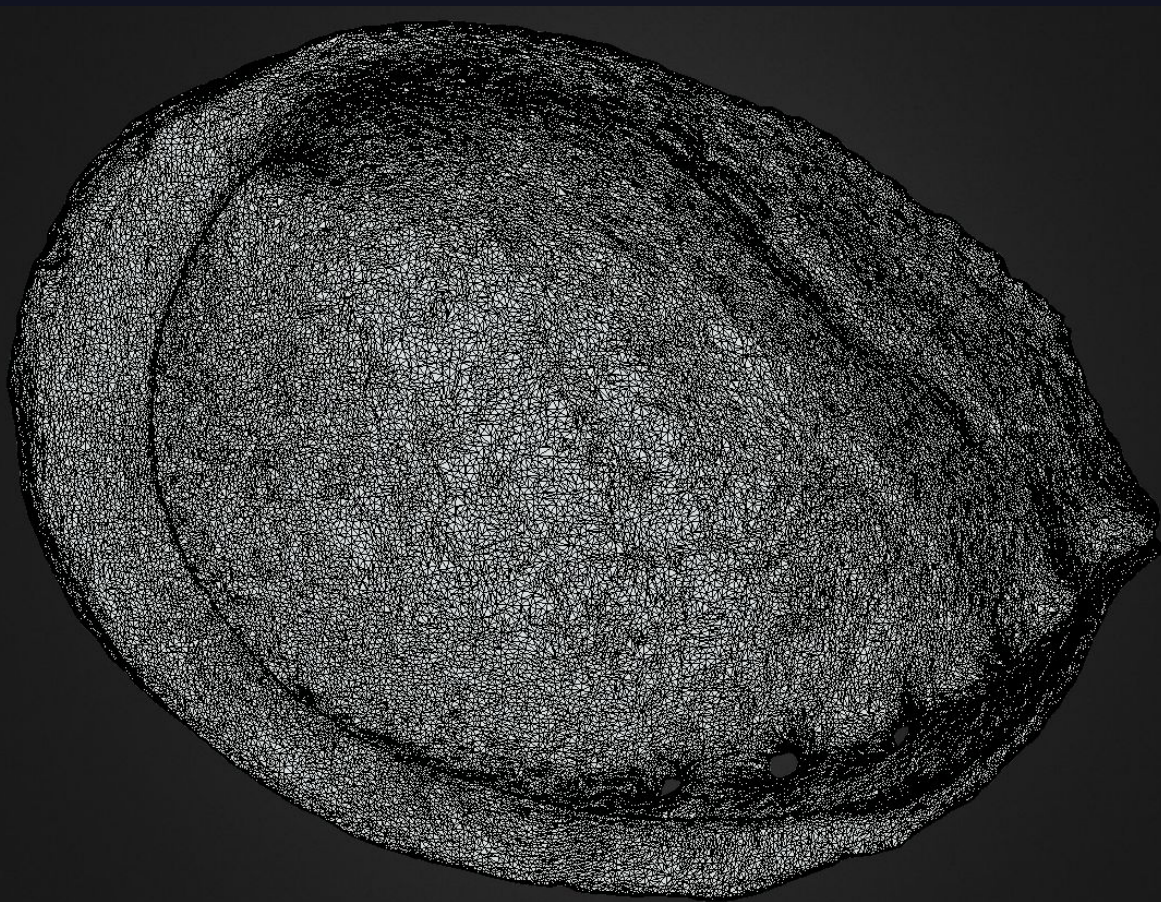
Material by Eric Chadwick, model by Abby Crawford (<https://skfb.ly/6TLUF>), both licensed under CC BY 4.0 (<http://creativecommons.org/licenses/by/4.0/>).



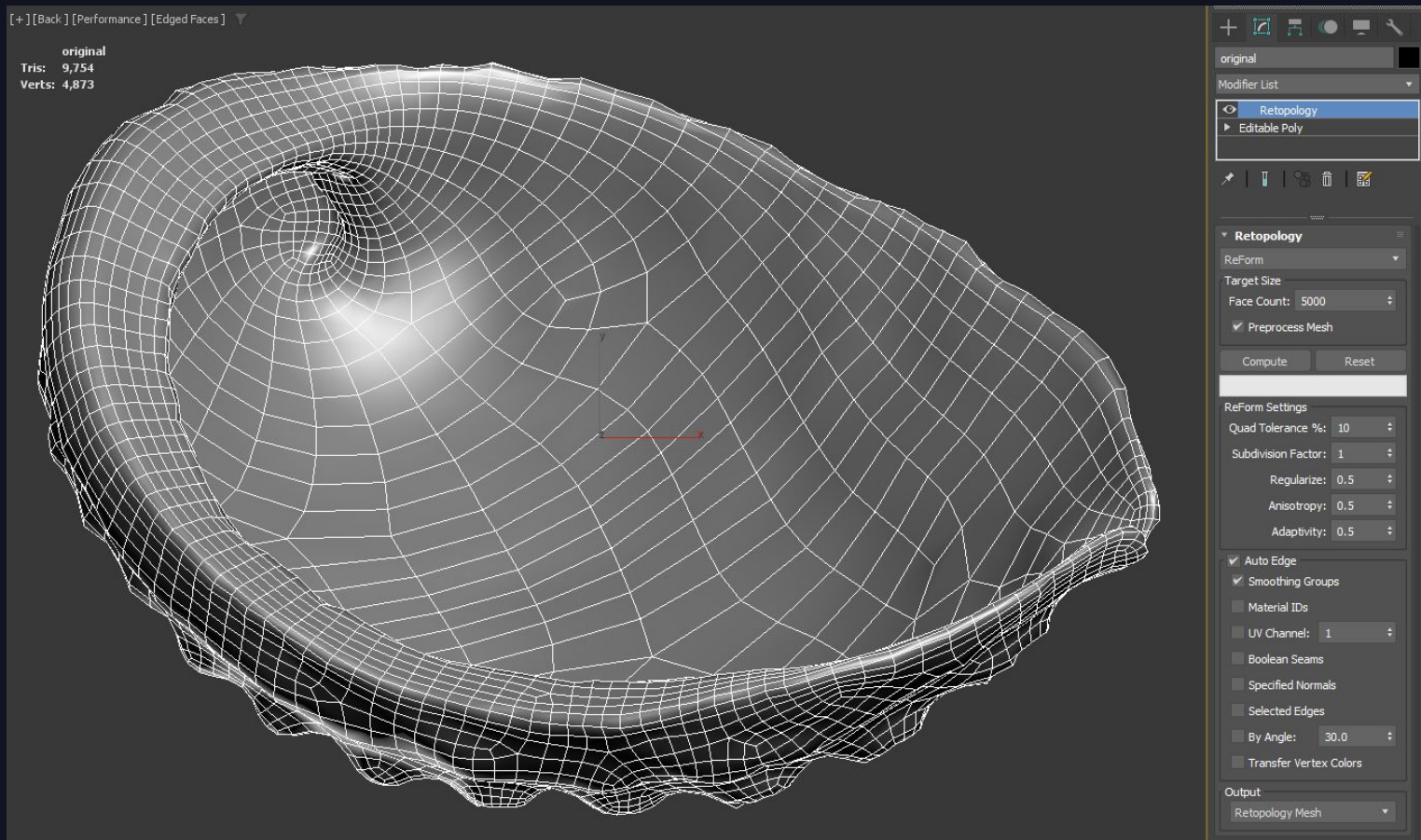
Advanced Controls

Sketchfab, photogrammetry by Abby Crawford, <https://skfb.ly/GTLF>

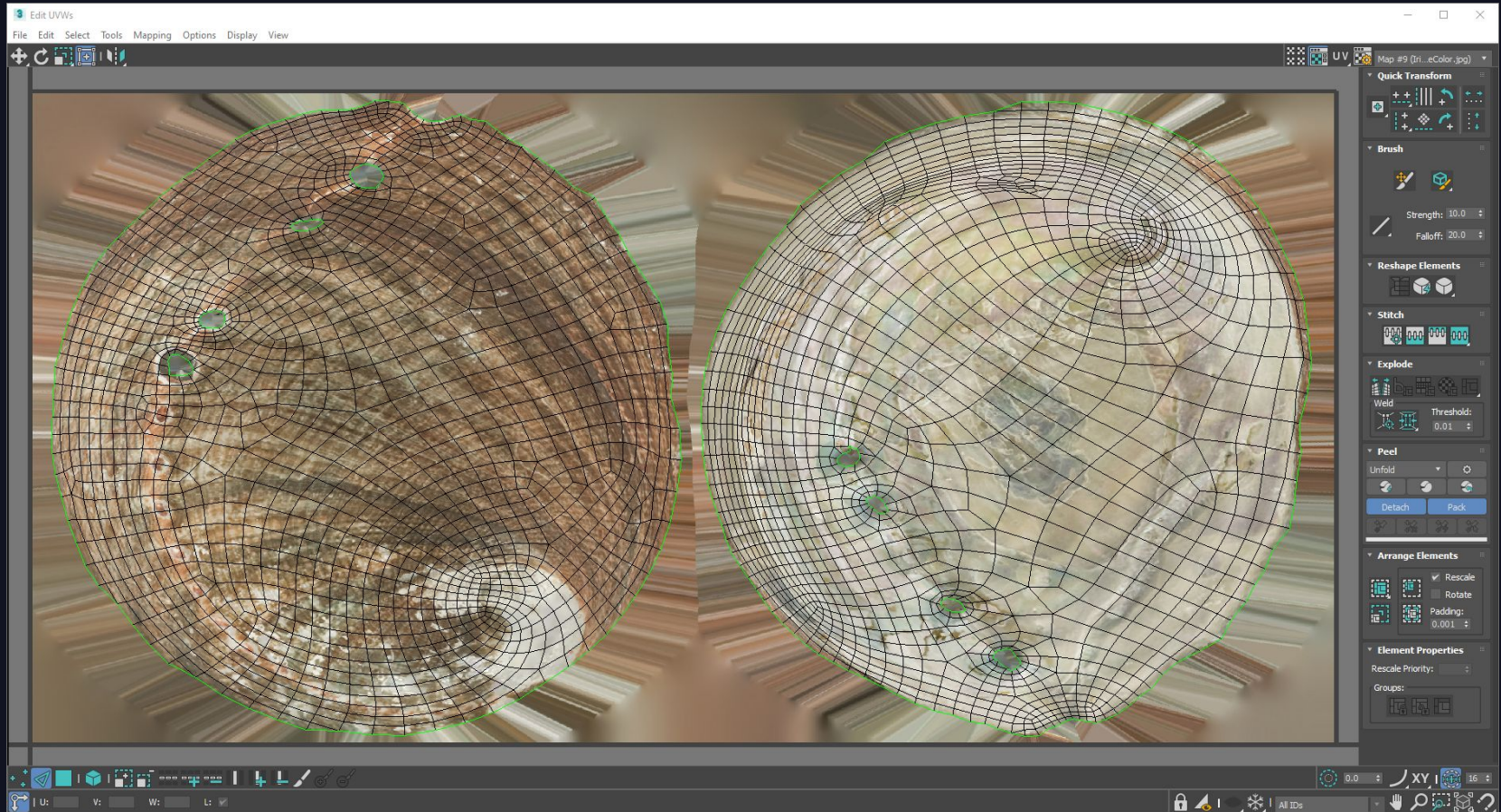




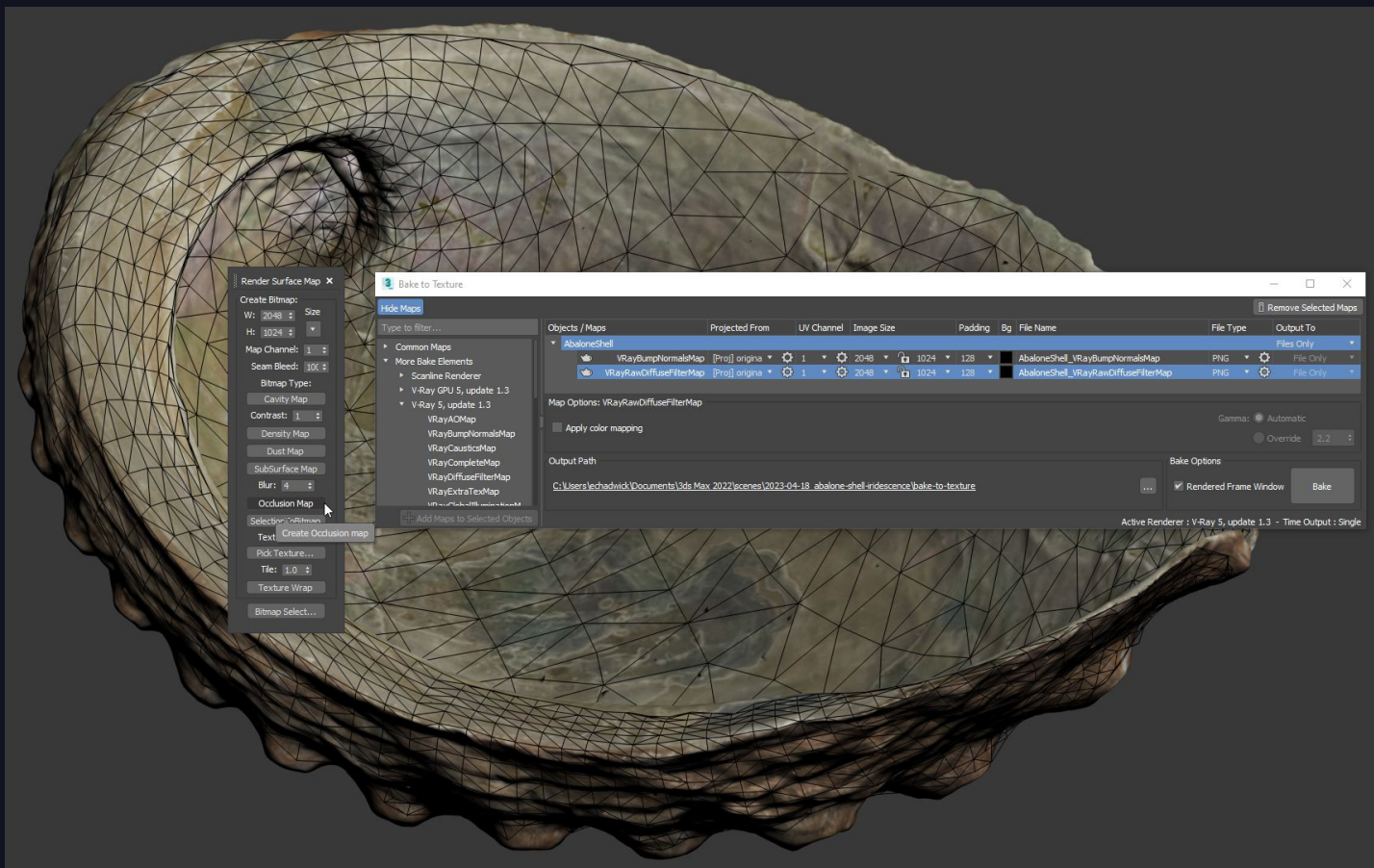
Retopology in 3ds Max



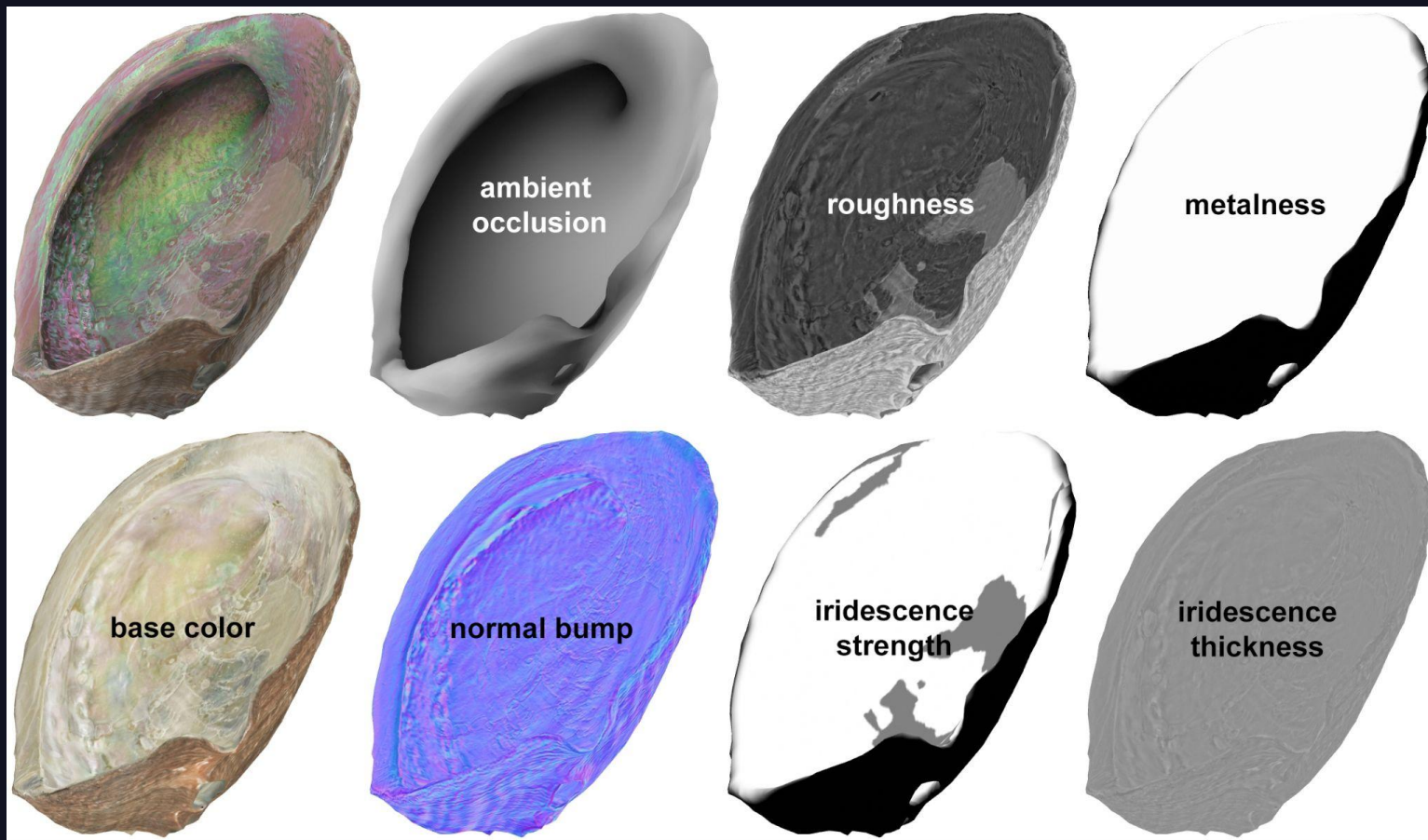
Unfold UVs, Relax UVs, Pack into 2048x1024



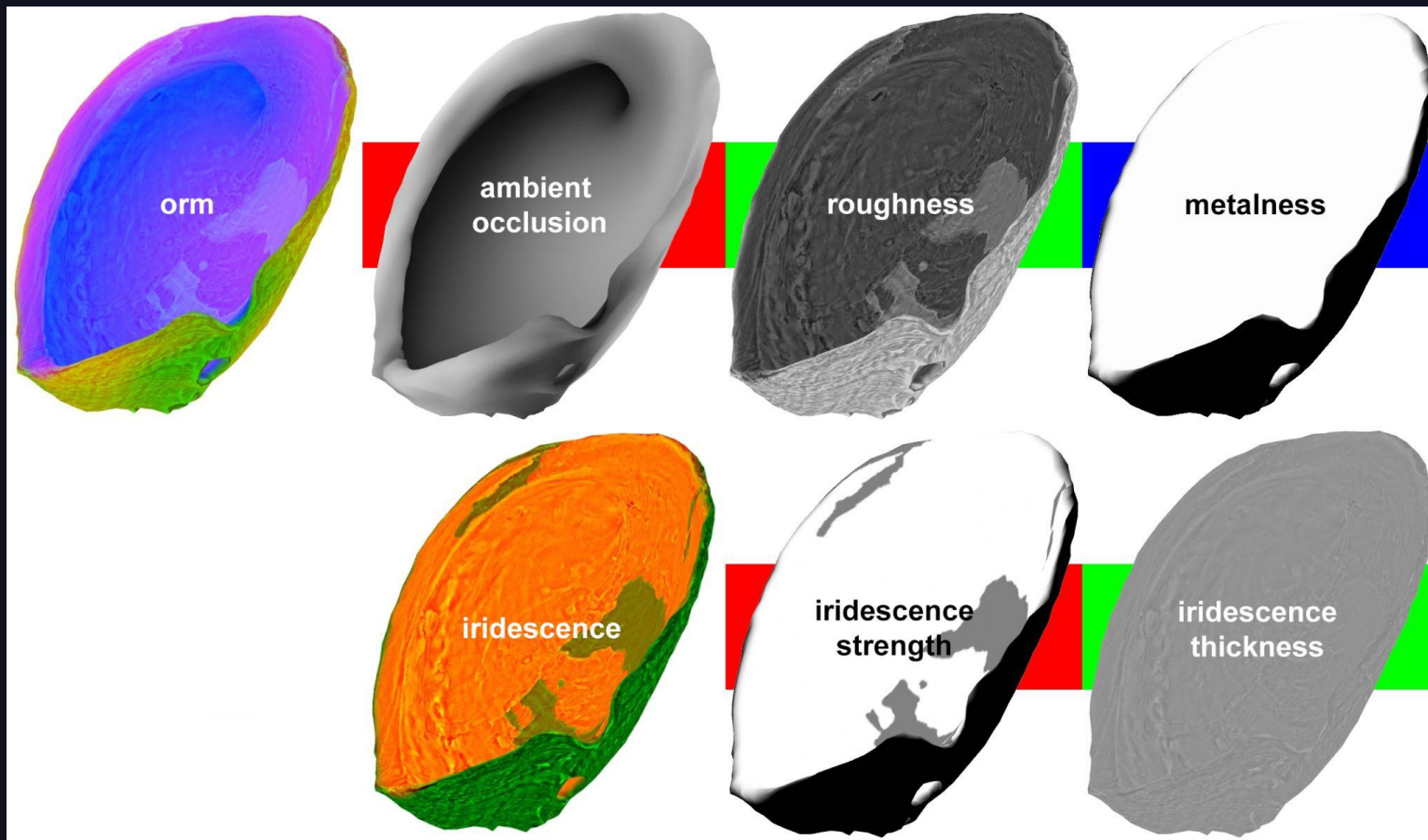
Bake To Texture: normal, diffuse, occlusion



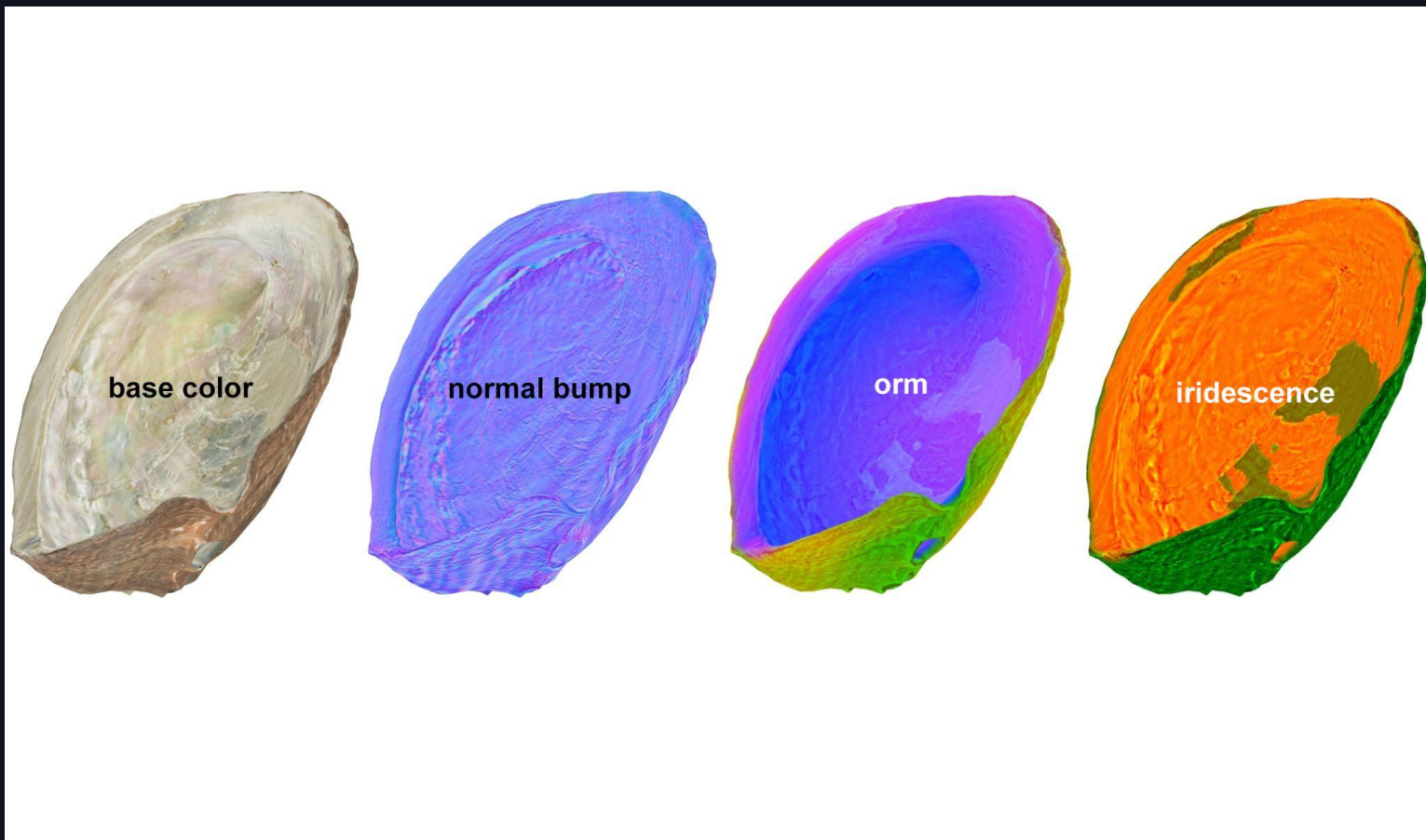
Generating Textures



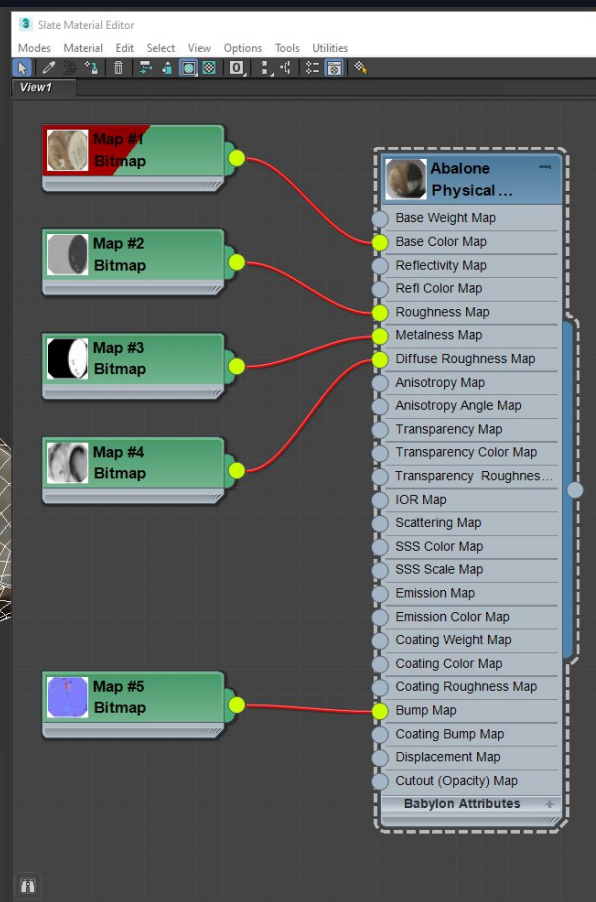
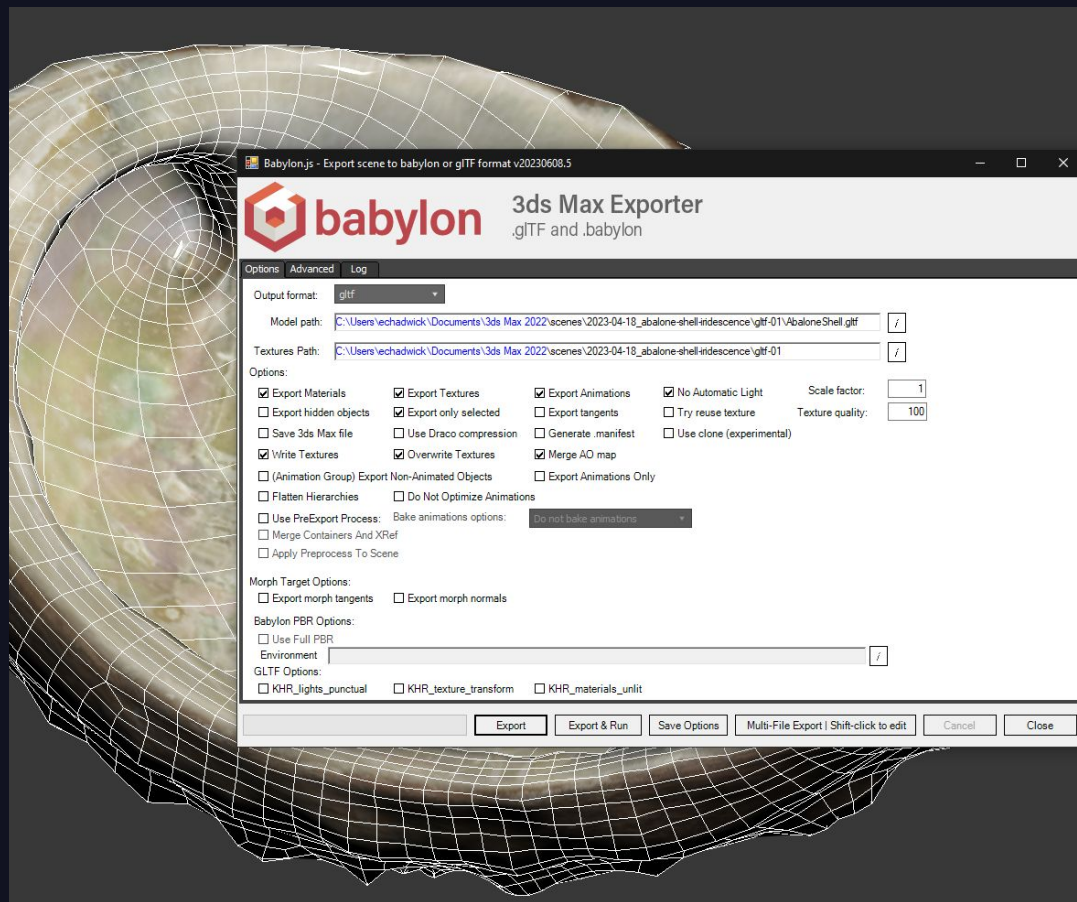
Channel-Packed Textures



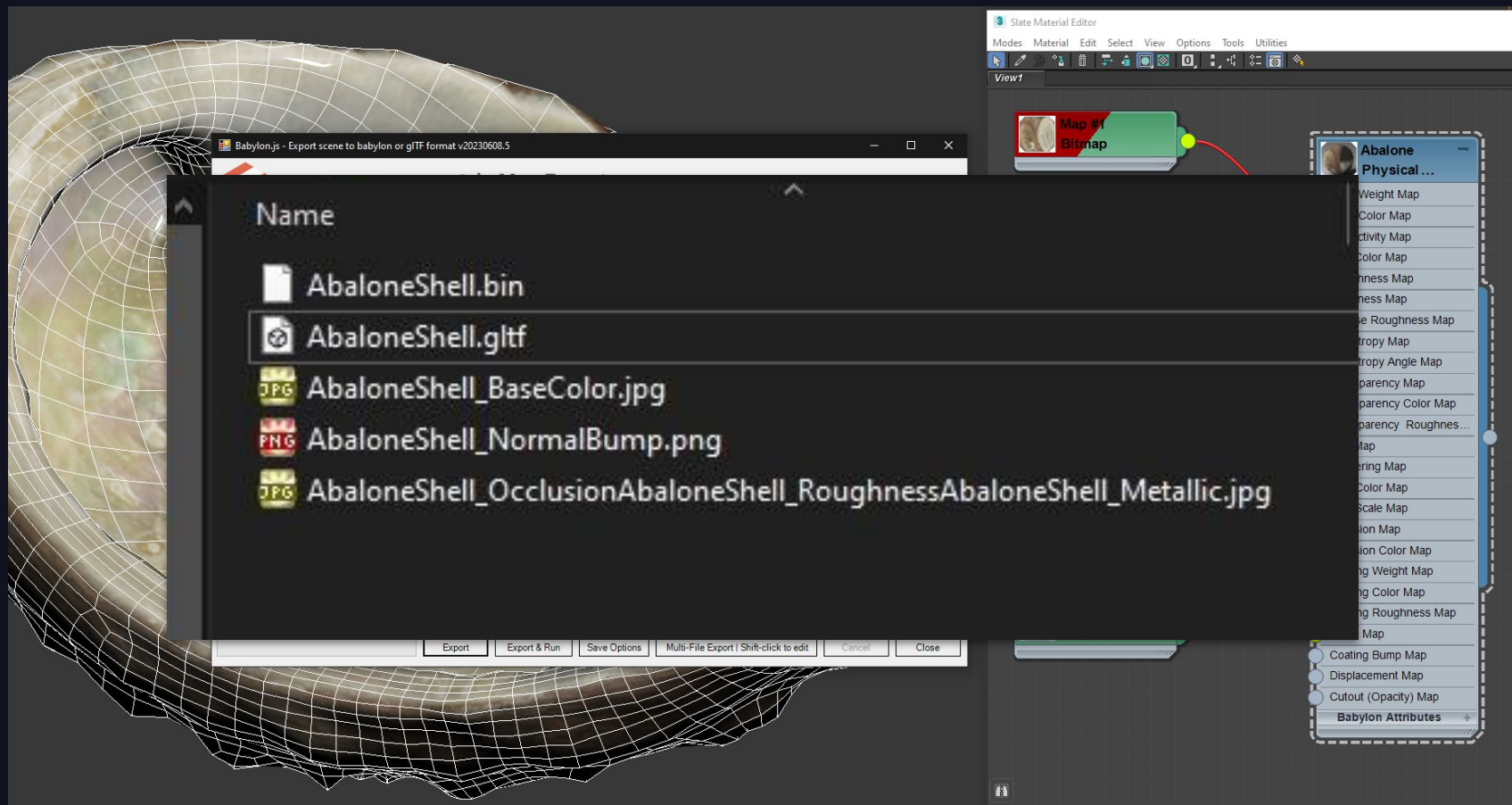
Final Textures



BabylonJS Exporter for 3ds Max

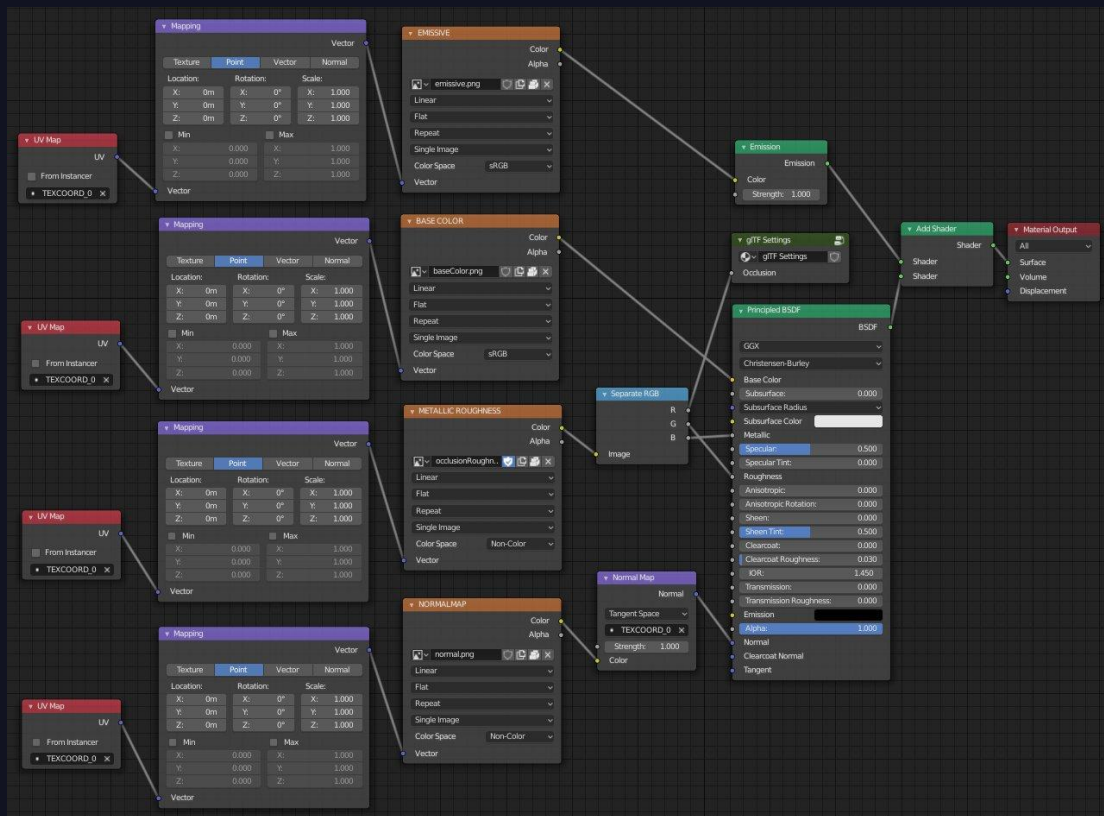


BabylonJS Exporter for 3ds Max



Blender glTF

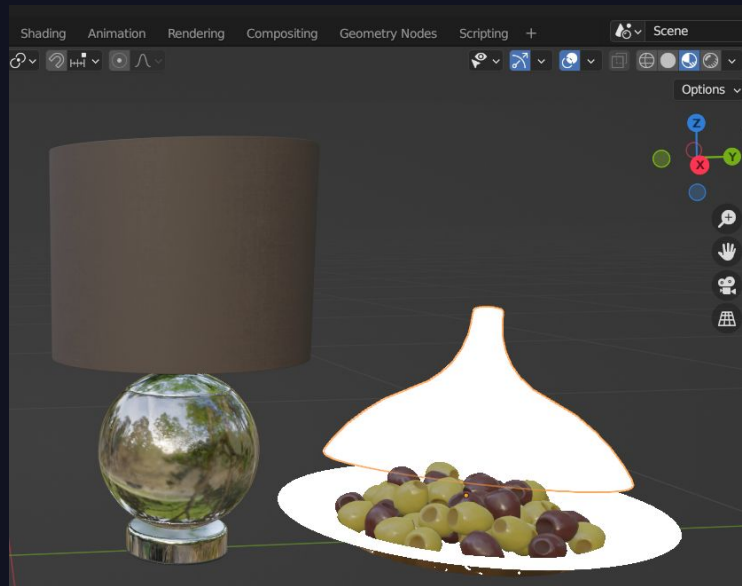
https://docs.blender.org/manual/en/2.80/addons/io_scene_gltf2.html



Blender glTF



glTF Sample Viewer



Blender import

Different rendering models, no glTF renderer in Blender, feature compatibility not 100%

In development... Principled v2 BSDF shader node

<https://projects.blender.org/blender/blender/issues/99447>

Visual Studio Code + Cesium's glTF Tools Extension

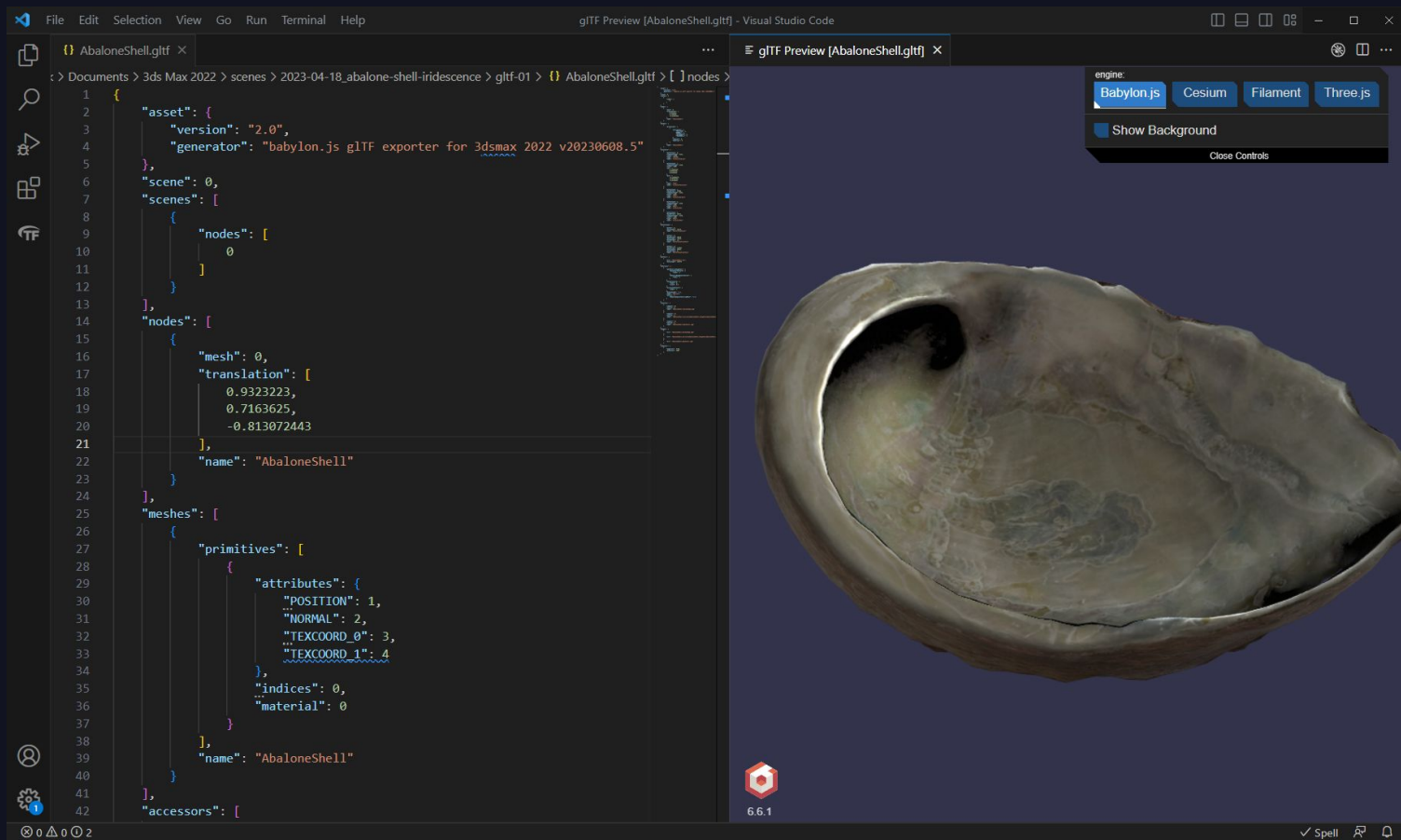
The screenshot displays the Visual Studio Code interface. On the left, the 'Extension: glTF Tools' page is visible, showing the extension's details, including its version (v2.4.0), download count (126,440), and a 5-star rating. The extension is described as 'Tools for glTF and GLB 3D models'. Below this, there's a section for 'glTF Tools Extension for Visual Studio Code' with a preview image and a description: 'Preview and debug glTF 3D models directly in the editor'. The command name is 'glTF: Preview 3D Model' with a default key binding of 'ALT + G'. The page also mentions that sample models and licenses can be obtained from the 'glTF-Sample-Models' repository.

On the right, the 'AbaloneShell.gltf' file is open in the editor. The code is a JSON file defining a 3D model. A context menu is open over the code, showing various actions and their keyboard shortcuts:

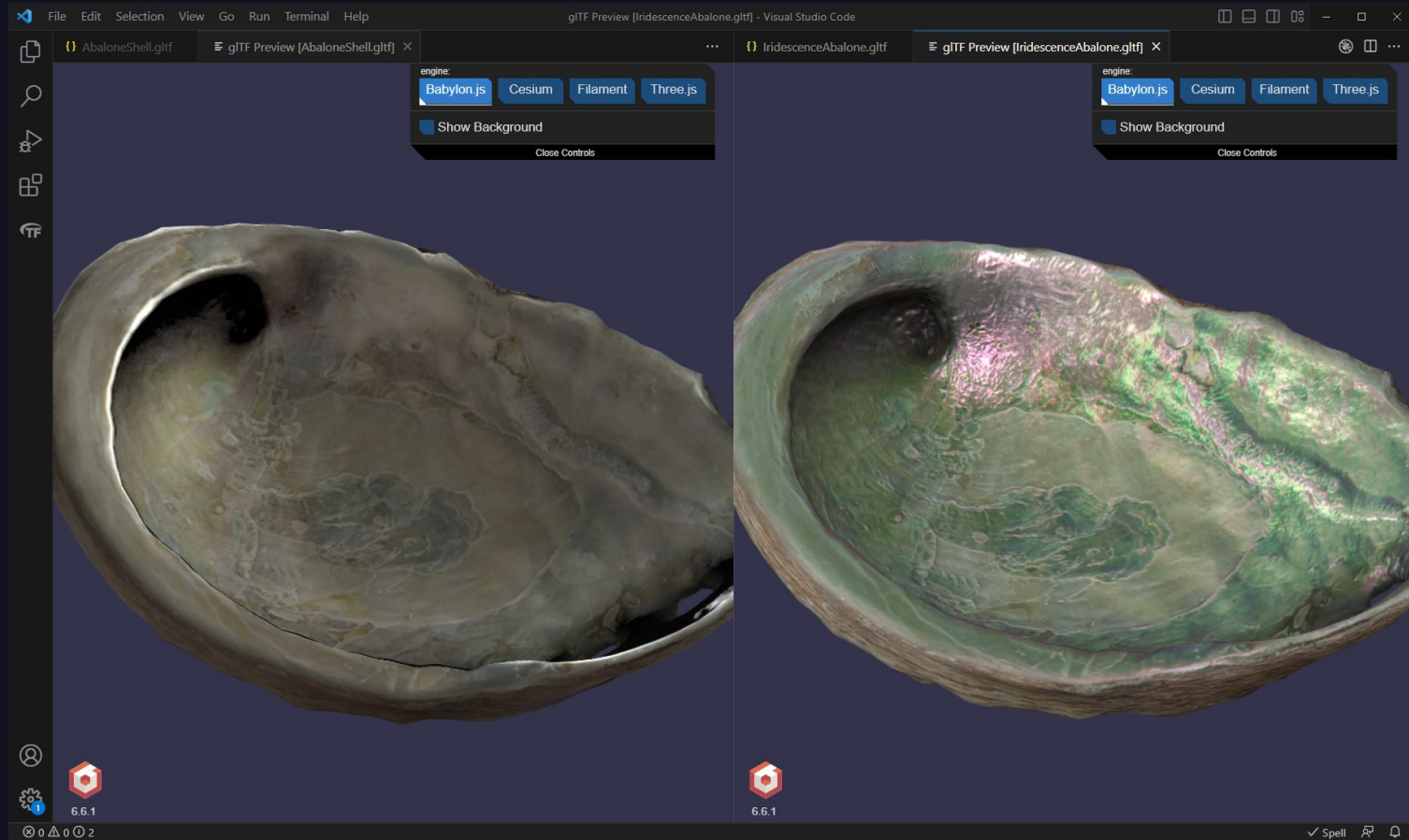
- Go to Definition (F12)
- Peek (>)
- Change All Occurrences (Ctrl+F2)
- Format Document (Shift+Alt+F)
- Refactor... (Ctrl+Shift+R)
- Cut (Ctrl+X)
- Copy (Ctrl+C)
- Paste (Ctrl+V)
- Spelling Suggestions... (>)
- Spelling (>)
- glTF: Export a Data URI to a file
- glTF: Import file as Data URI
- glTF: Inspect Data (Alt+D)
- glTF: Preview 3D Model (Alt+G)
- Command Palette... (Ctrl+Shift+P)

The status bar at the bottom indicates the current line and column (Ln 1, Col 1999), the number of spaces (4), the encoding (UTF-8), the line ending (CRLF), the file type (JSON), and the number of spelling suggestions (1).

Editing glTF in VS Code



Materials: Before and After



What are the Iridescence Parameters?

Check the spec: [KHR_materials_iridescence](#)

Code

main

Go to file

src/main

README.md

KHR_materials_clearcoat

KHR_materials_emissive_stren...

KHR_materials_ior

KHR_materials_iridescence

figures

schema

README.md

KHR_materials_sheen

KHR_materials_specular

KHR_materials_transmission

KHR_materials_unlit

KHR_materials_variants

KHR_materials_volume

KHR_mesh_quantization

KHR_texture_basisu

KHR_texture_transform

KHR_xmp_json_ld

Vendor

Prefixes.md

README.md

Template.md

specification

.gitignore

CODE_OF_CONDUCT.md

gITF / extensions / 2.0 / Khronos / KHR_materials_iridescence /

Extending Materials

The iridescence materials are defined by adding the `KHR_materials_iridescence` extension to any gITF material.

```
{
  "materials": [
    {
      "extensions": {
        "KHR_materials_iridescence": {
          "iridescenceFactor": 1.0,
          "iridescenceIor": 1.3,
          "iridescenceThicknessMaximum": 400.0
        }
      }
    }
  ]
}
```

Properties

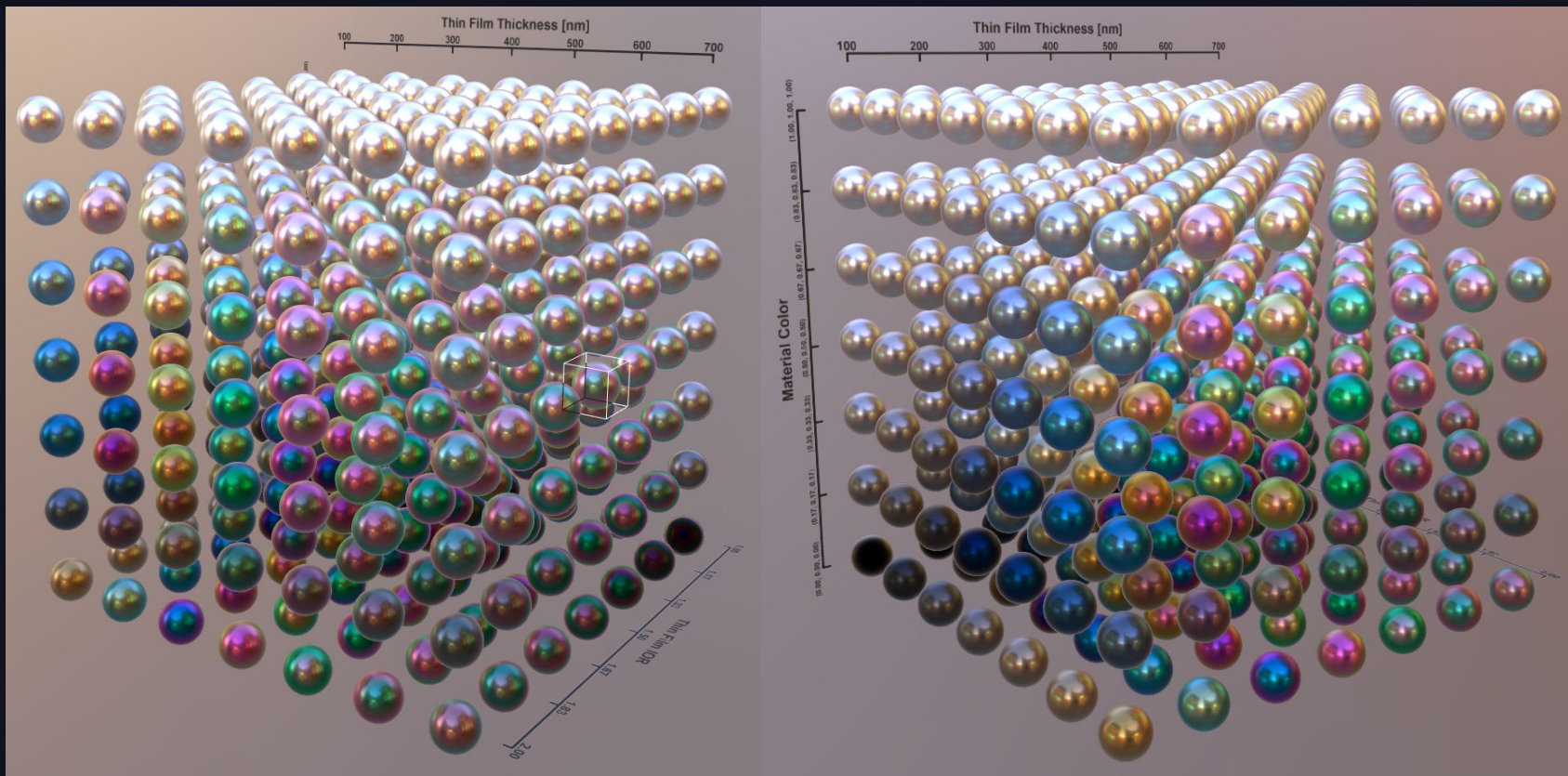
All implementations should use the same calculations for the BRDF inputs. Implementations of the BRDF itself can vary based on device performance and resource constraints. See [appendix](#) for more details on the BRDF calculations.

	Type	Description	Required
iridescenceFactor	number	The iridescence intensity factor.	No, default: 0.0
iridescenceTexture	textureInfo	The iridescence intensity texture.	No
iridescenceIor	number	The index of refraction of the dielectric thin-film layer.	No, default: 1.3
iridescenceThicknessMinimum	number	The minimum thickness of the thin-film layer given in nanometers.	No, default: 100.0
iridescenceThicknessMaximum	number	The maximum thickness of the thin-film layer given in nanometers.	No, default: 400.0
iridescenceThicknessTexture	textureInfo	The thickness texture of the thin-film layer.	No

The values for iridescence intensity can be defined using a factor, a texture, or both. `iridescenceFactor` is multiplied with the red channel of `iridescenceTexture` to control the overall strength of the iridescence effect. If the texture is not set, a value of 1.0 is assumed for the texture.

Iridescence Parameters

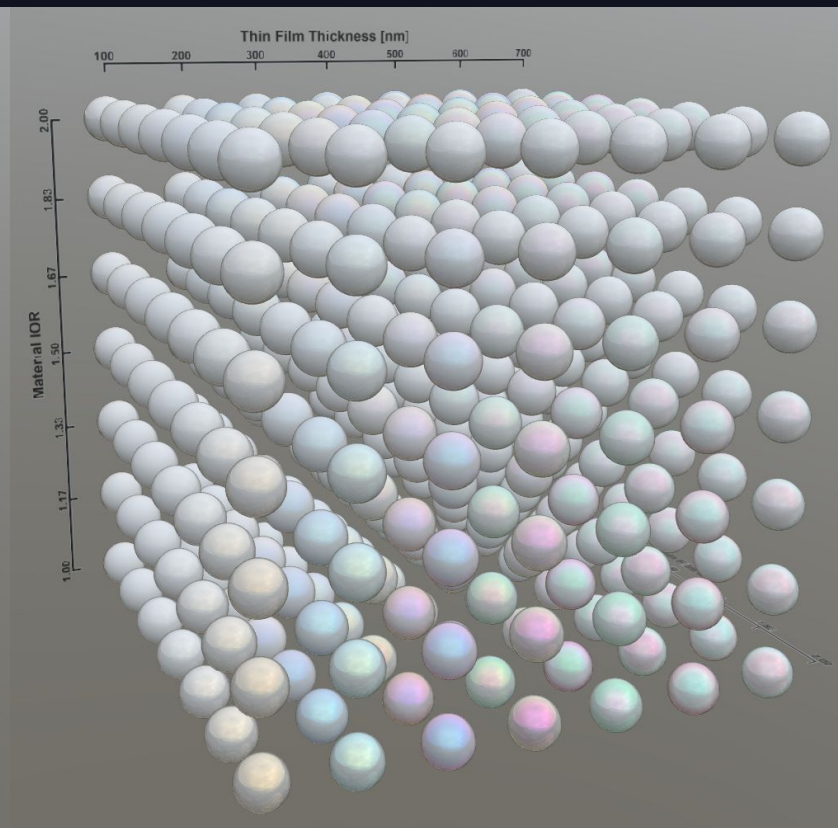
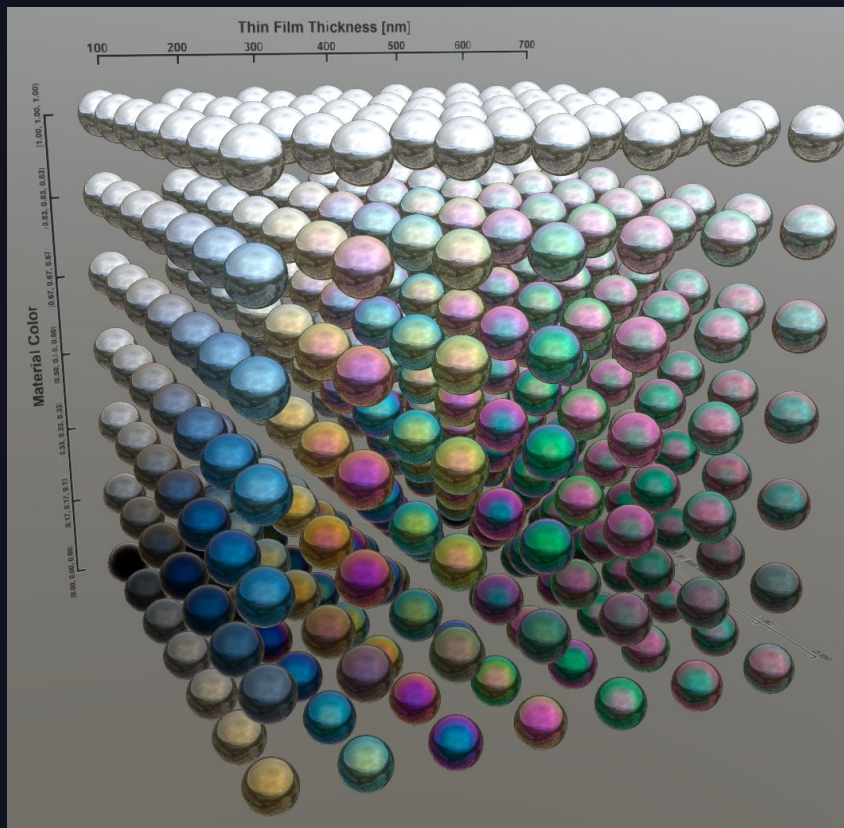
Thickness, IOR, Color



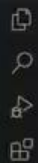
<https://github.com/KhronosGroup/glTF-Sample-Assets/tree/main/Models/IridescenceMetallicSpheres>

Iridescence Parameters

Metallic vs. Dielectric



<https://github.com/KhronosGroup/glTF-Sample-Assets/tree/main/Models/IridescenceDielectricSpheres>



Show All
Commands **Ctrl + Shift + P**

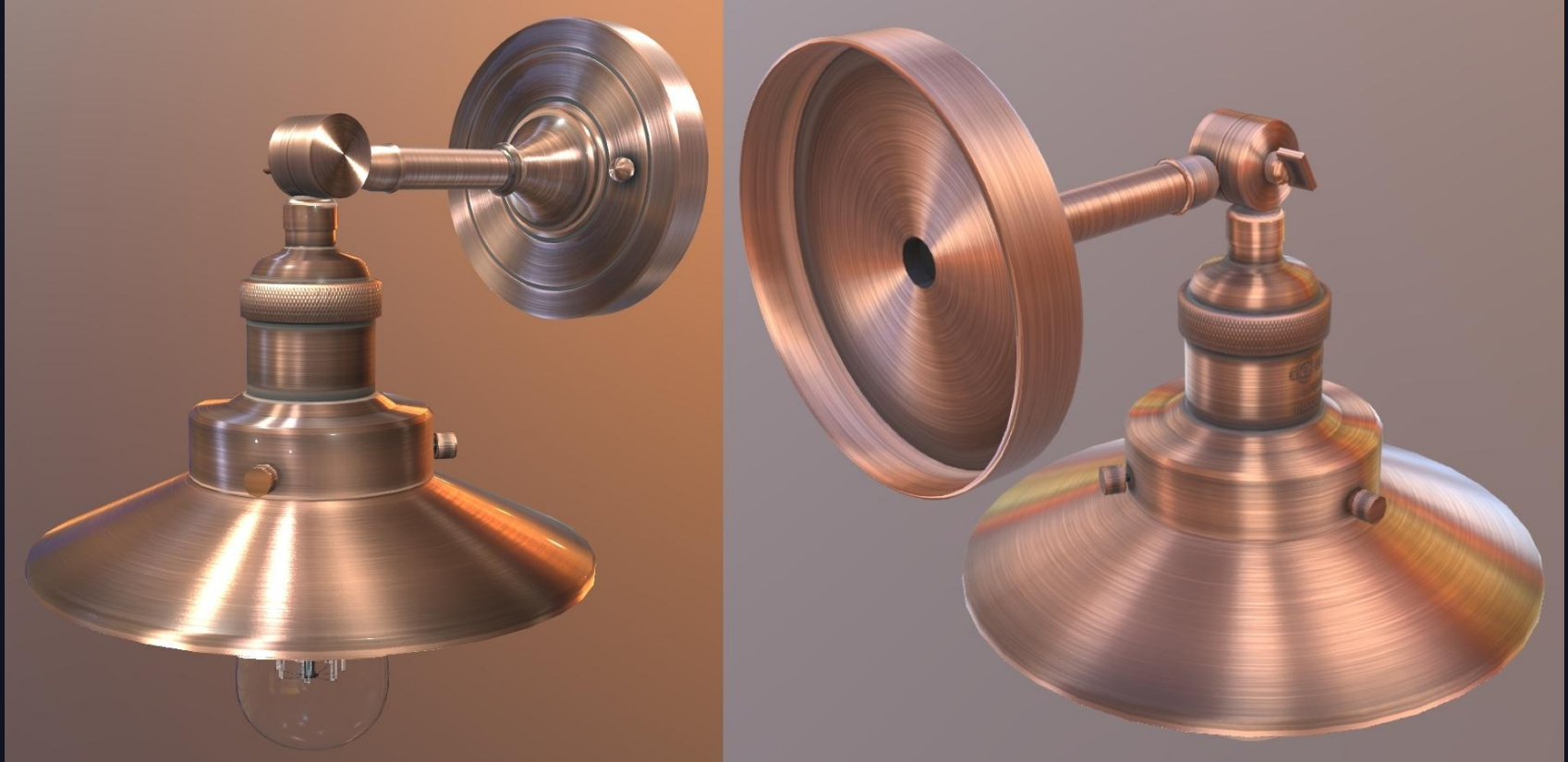
Open File **Ctrl + O**

Open Folder **Ctrl + K, Ctrl + O**

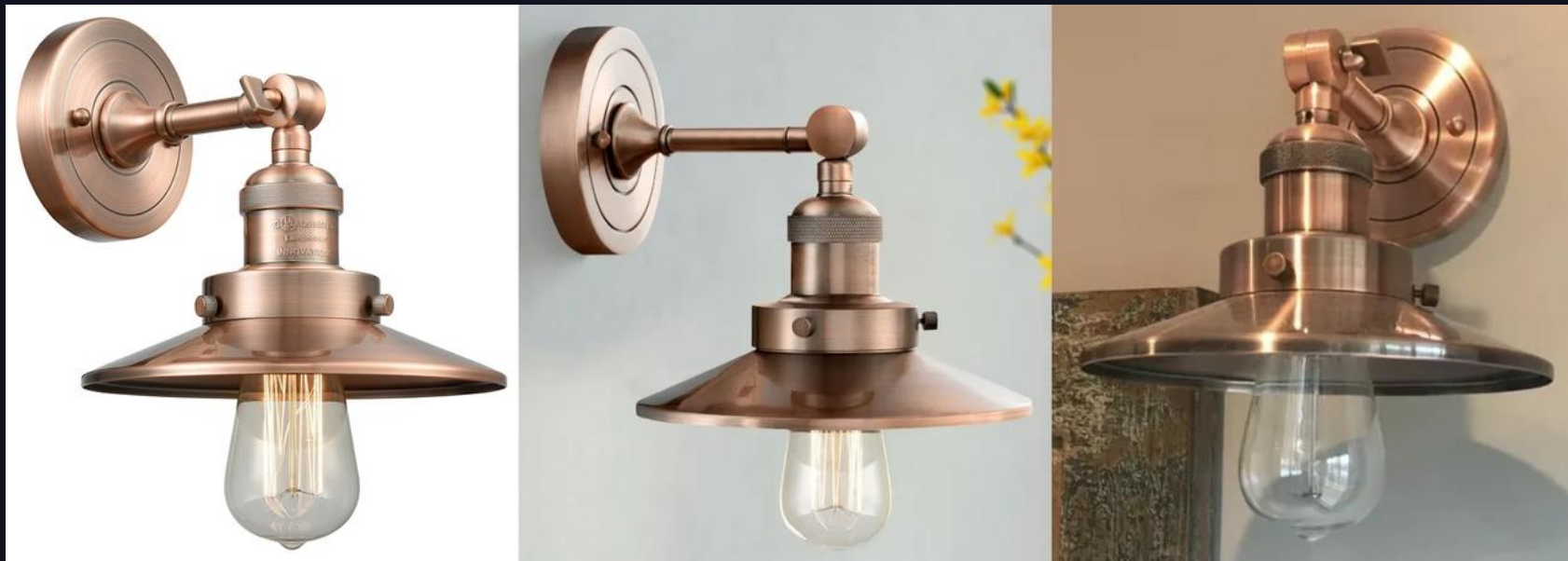
Open Recent **Ctrl + R**



glTF Extension - KHR materials anisotropy



Based on a Real Product



Antique Copper Barn Light on Wayfair

Brushed copper with a clearcoat finish

Anisotropy examples



Horse: [Sabu Varghese](#)
Record: Ryankusumojr
Braid: [Stilfehler](#)
Pan: [NatalieMaynor/](#)



Models

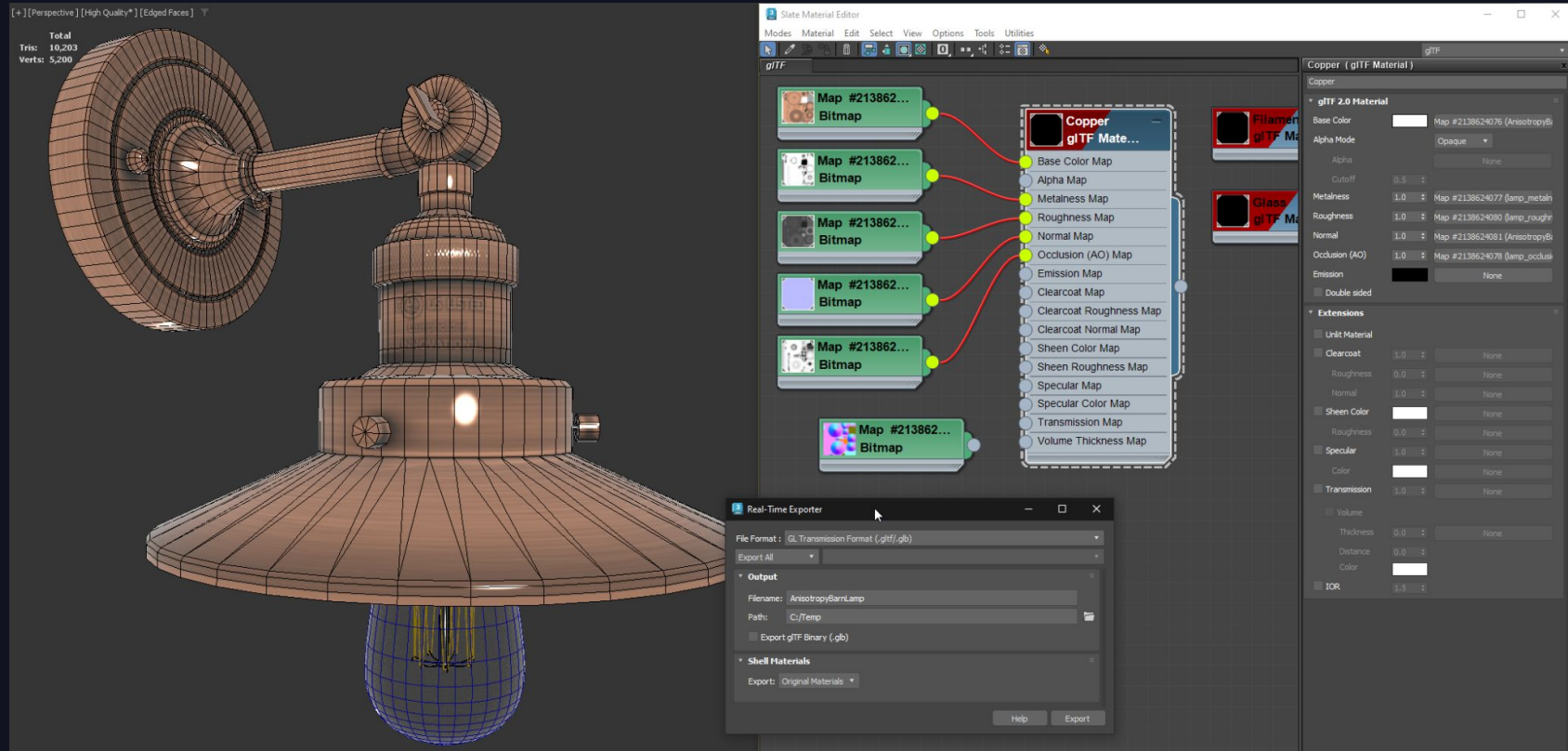
Display

Animation

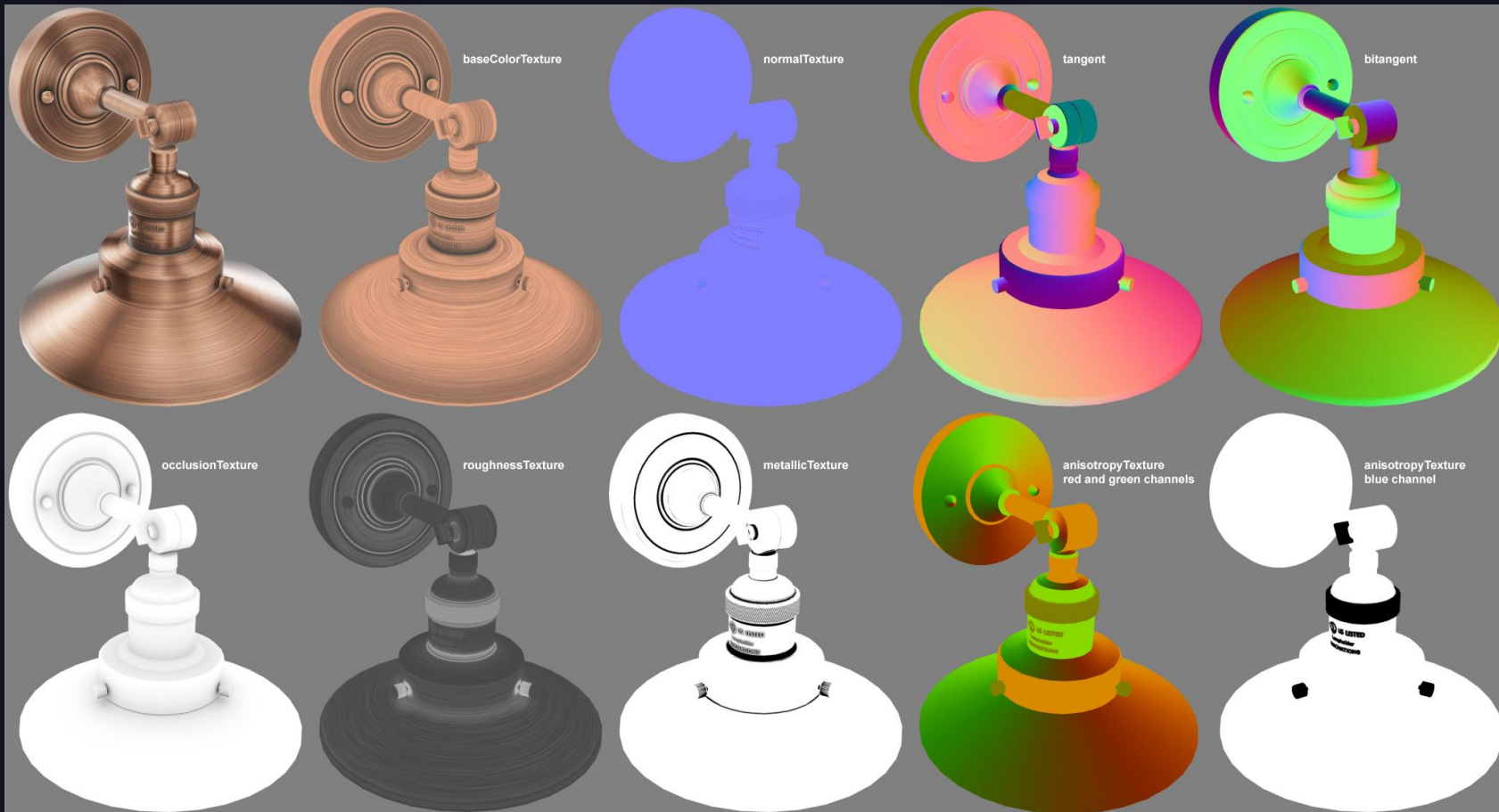
Credits

Advanced
Controls

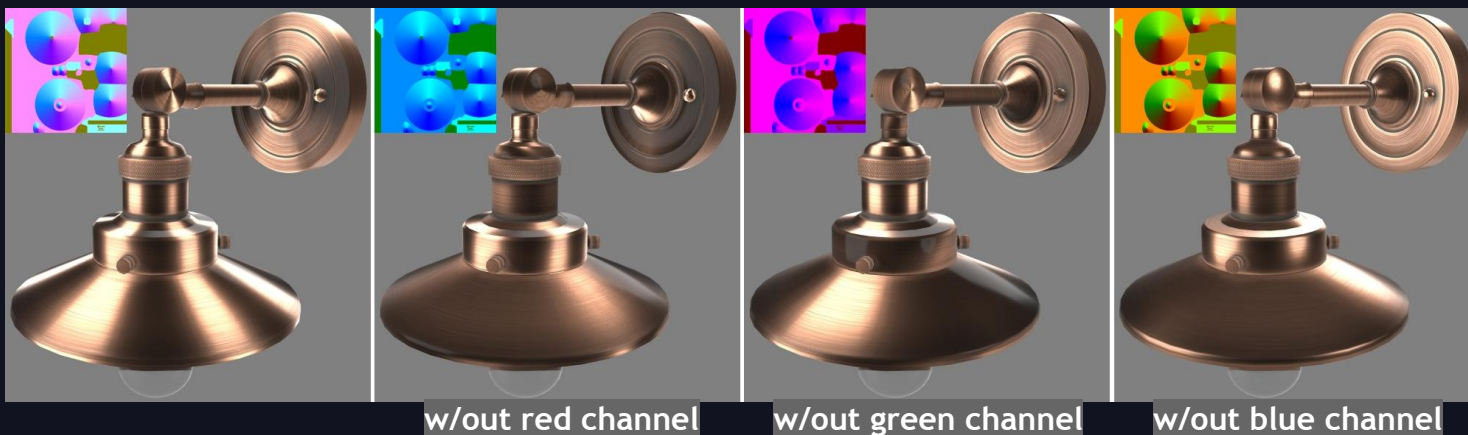
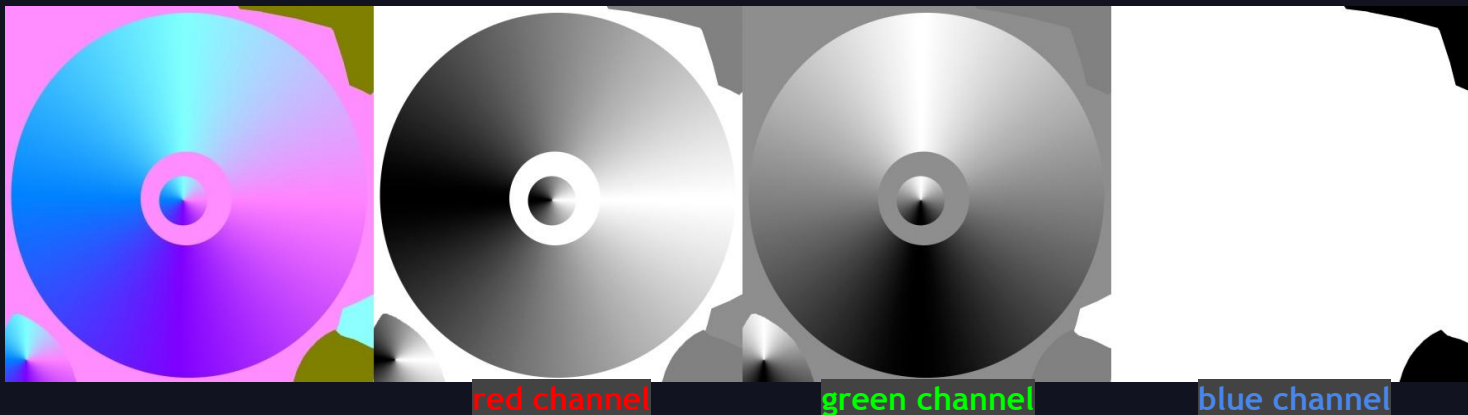
glTF Material & glTF Exporter in 3ds Max



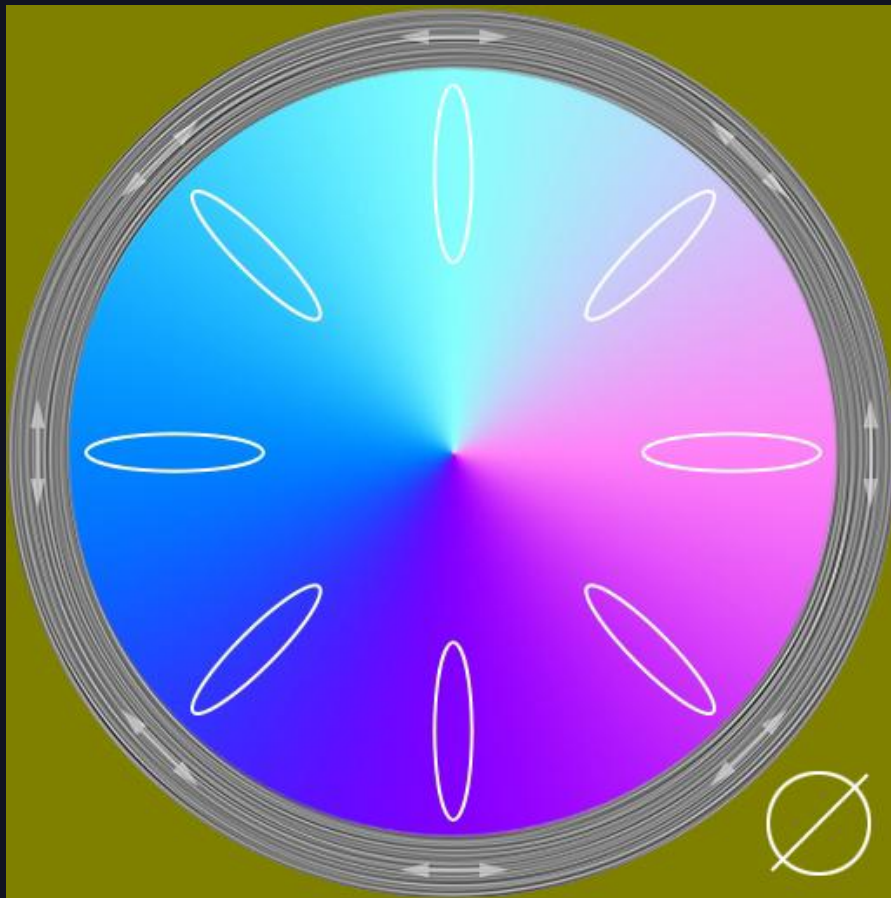
Anisotropy - Inputs



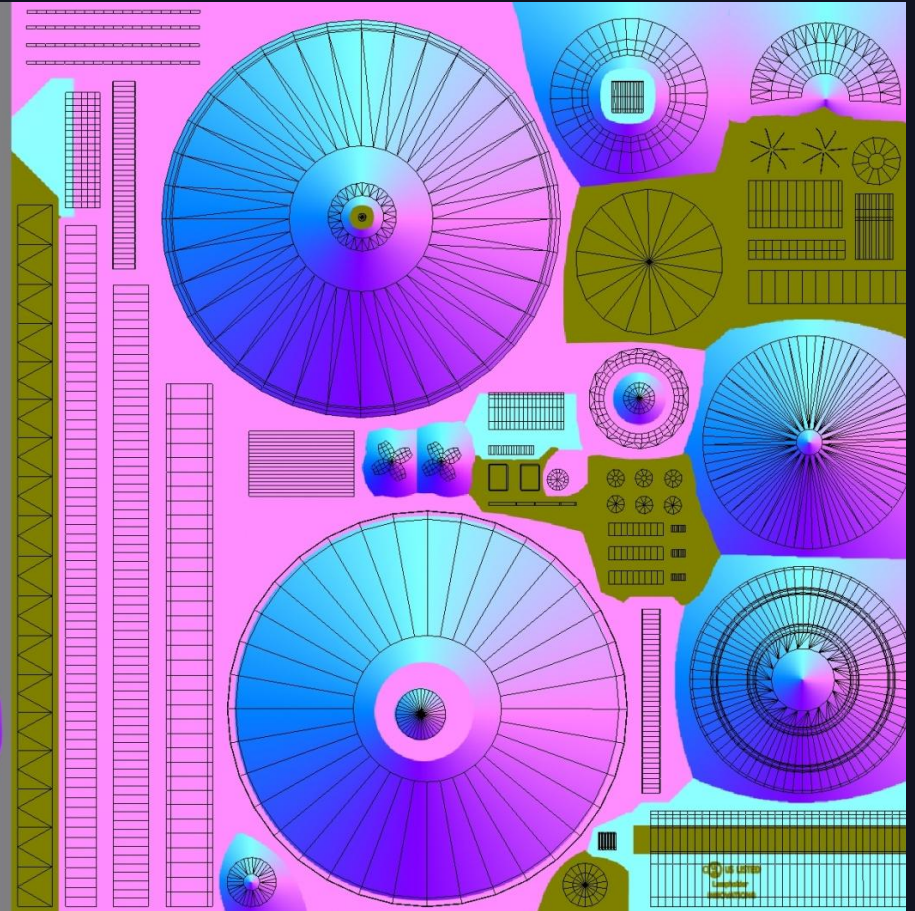
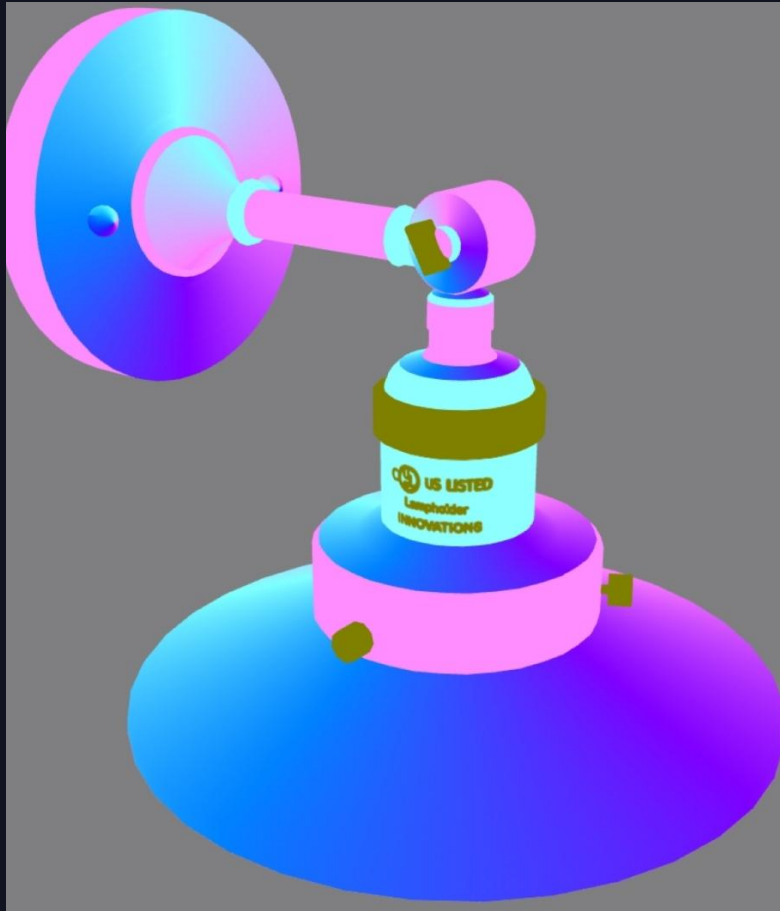
Anisotropy Texture - RGB Channels



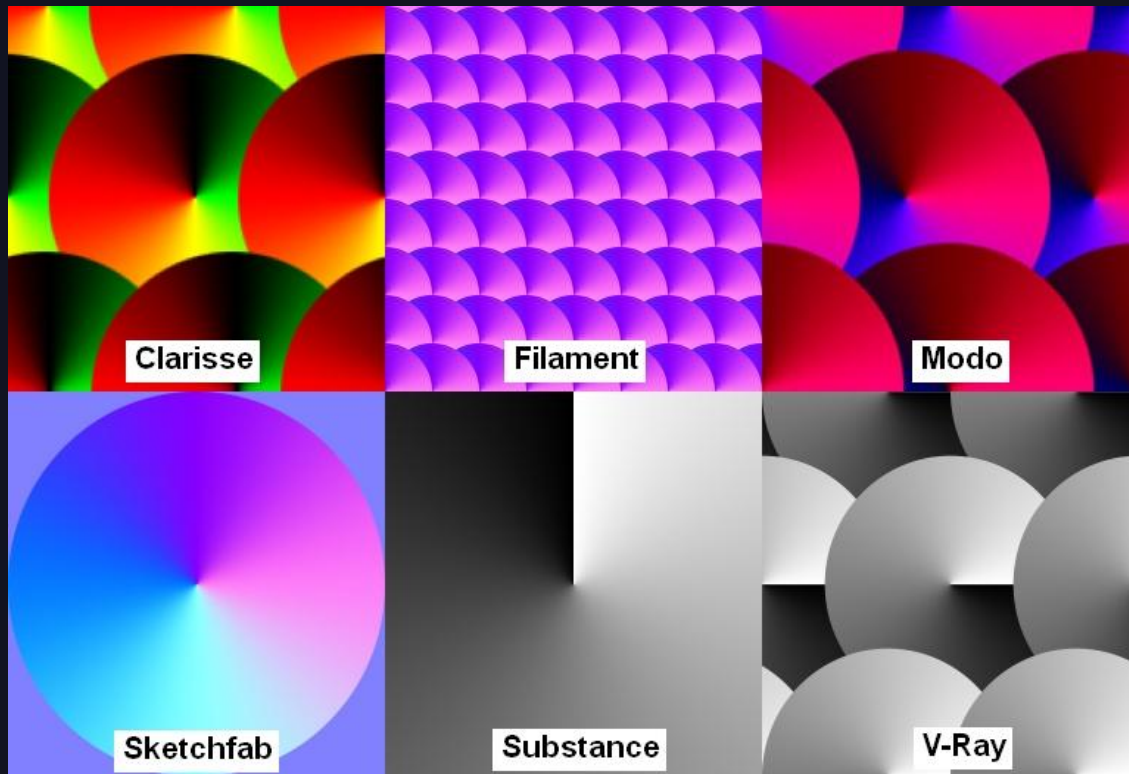
Anisotropy Texture - Radial Directions



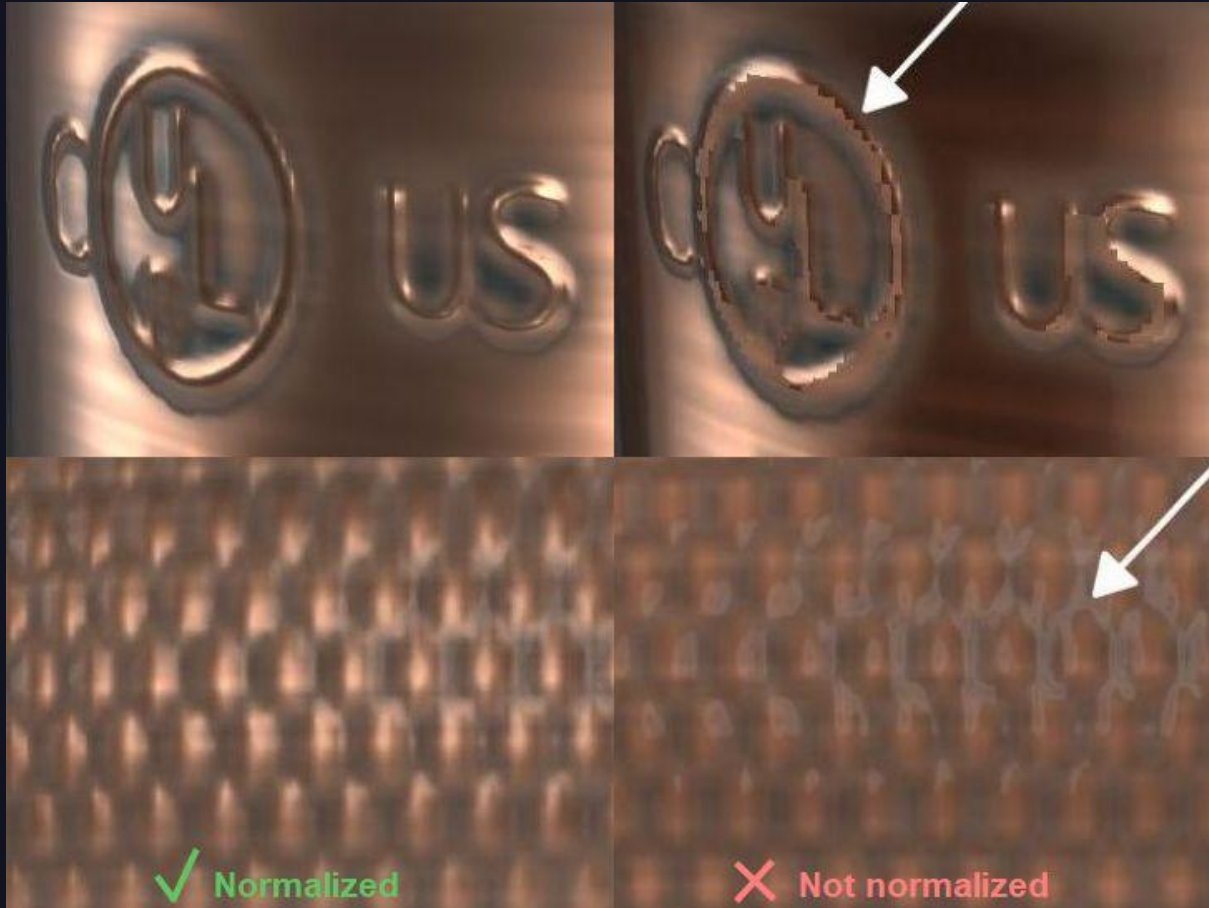
Anisotropy Texture - UV Directions



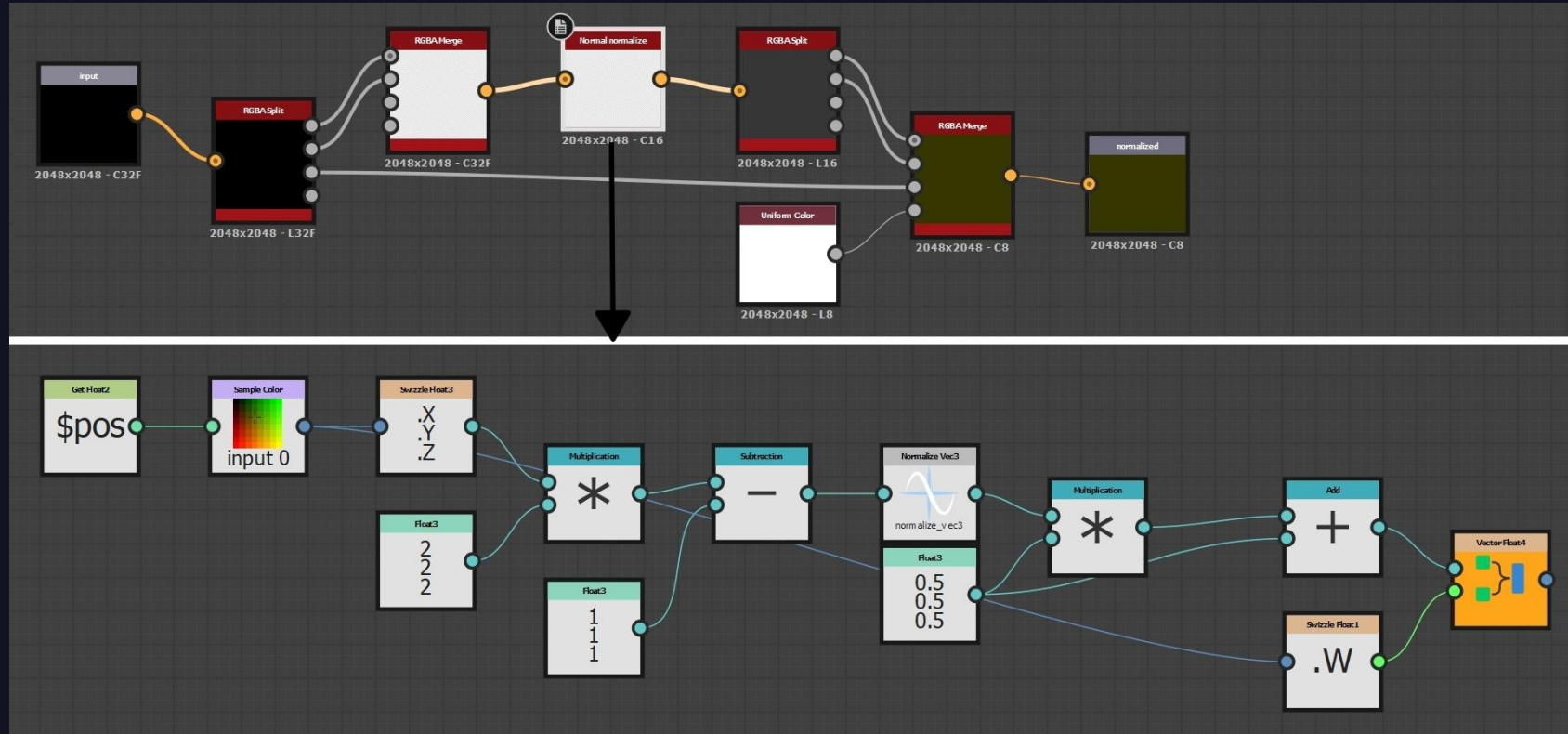
Anisotropy Texture - Compared to Other Renderers



Anisotropy Texture - Normalized vs. Not

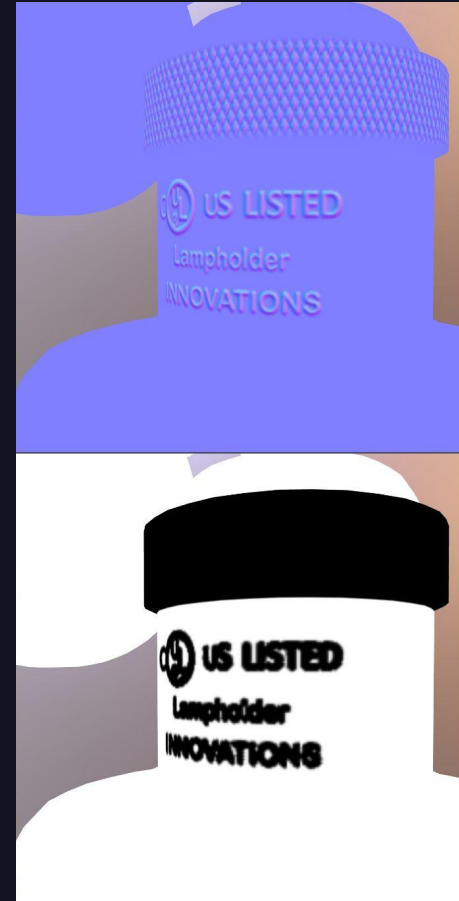


Anisotropy Texture - Normalize in Substance3D Designer



https://github.com/KhronosGroup/glTF-Sample-Assets/blob/main/Models/AnisotropyBarnLamp/screenshot/Substance_NormalizeRG.zip
(<https://shorturl.at/lwSX5>)

Normal Bump - Masking





Links

Game portfolio: ericchadwick.com

glTF Iridescence

- [IridescenceAbalone](#) glTF sample asset
- [KHR materials iridescence](#) specification
- [BabylonJS Exporters](#) for 3ds Max, Blender, Cinema 4D, Maya, etc.
- [Blender glTF Exporter](#) Blender Manual
- [Blender BSDF v2](#) Blender Projects
- [Visual Studio Code](#) and [Cesium glTF Tools](#)
- [IridescenceMetallicSpheres](#) glTF sample asset
- [IridescenceDielectricSpheres](#) glTF sample asset

glTF Anisotropy

- [AnisotropyBarnLamp](#) glTF sample asset
- [KHR materials anisotropy](#) specification
- [3ds Max glTF Exporter](#) help

Bonus! [Adding Material Extensions to glTF Models](#)

[Slides and Videos](#)

