

# Translucence and Pearlescence in Betta Fish

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Translucence

Pearlescence



Final image

# Some previous attempts

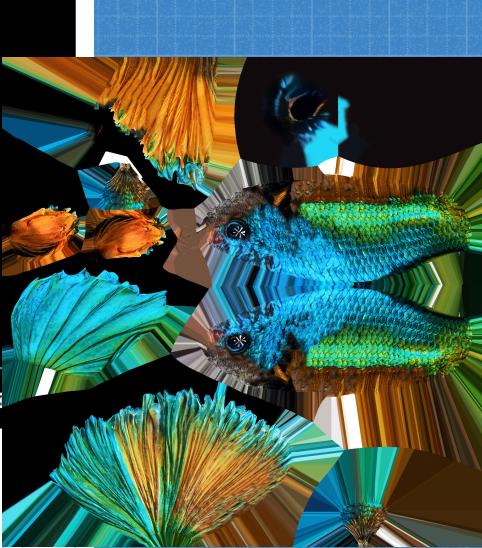
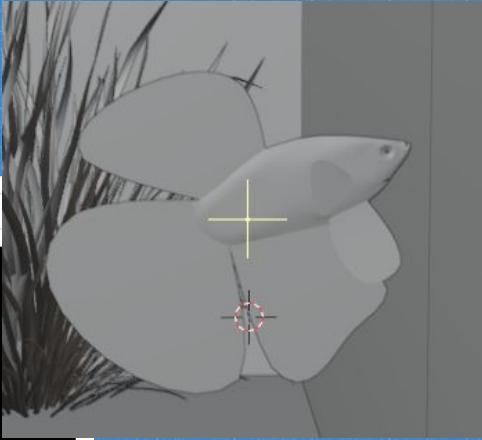
Sketchfab EXPLORE BUY 3D MODELS FOR BUSINESS Search 3D models

Need to implement pearlescence and translucence

Betta Splendens

3D Model

BlueMesh FOLLOW



Translucence

Opacity maps -  
photoshop

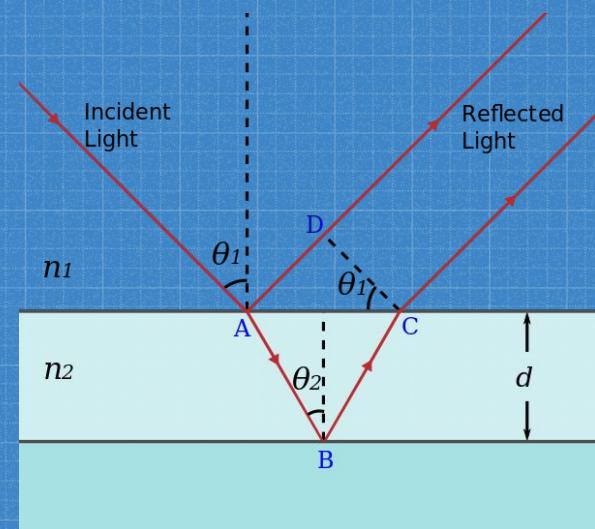
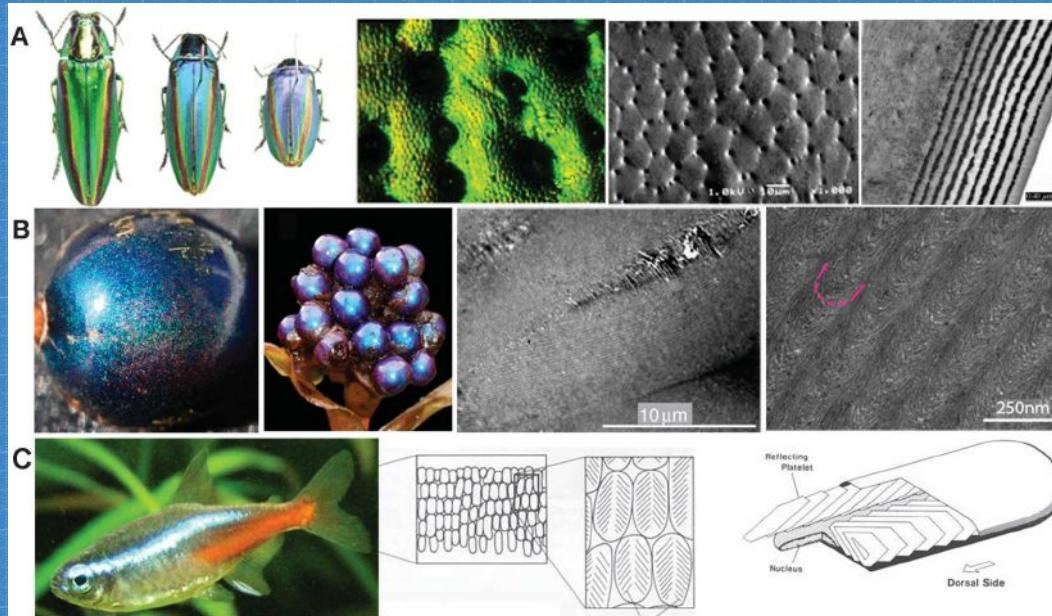
Fix artifacts -  
blender

Added grass to  
showcase  
translucence

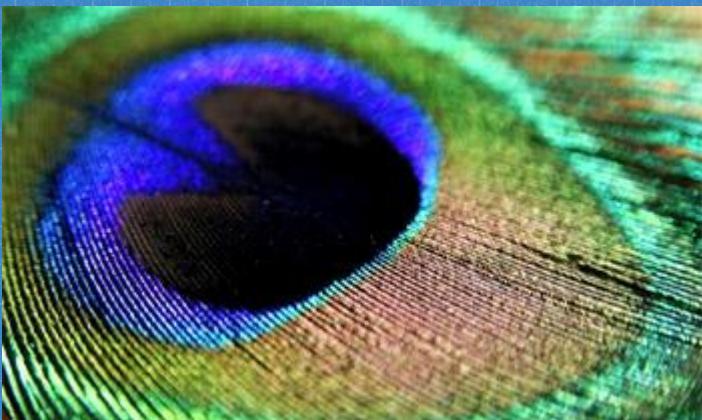
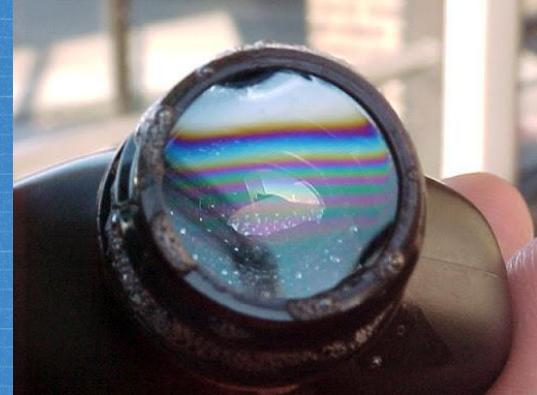


# Pearlescence

- Wrote custom shader script for Blender BSDF node
- Simulates multi-film interference



# More thin films!



# Pearlescence

- Takes in thickness, index of refraction, and extinction coefficient k for top, middle, and substrate layers
- Outputs reflected percentage of light per color at angle between normal and ray of light

$$r^{(p,s)} = \frac{r_{1,2}^{(p,s)} + r_{2,3}^{(p,s)} \exp(2ik_{2z}d)}{1 + r_{1,2}^{(p,s)} r_{2,3}^{(p,s)} \exp(2ik_{2z}d)},$$
$$t^{(p,s)} = \frac{t_{1,2}^{(p,s)} t_{2,3}^{(p,s)} \exp(ik_{2z}d)}{1 + r_{1,2}^{(p,s)} r_{2,3}^{(p,s)} \exp(2ik_{2z}d)},$$



# Step-by-step



albedo



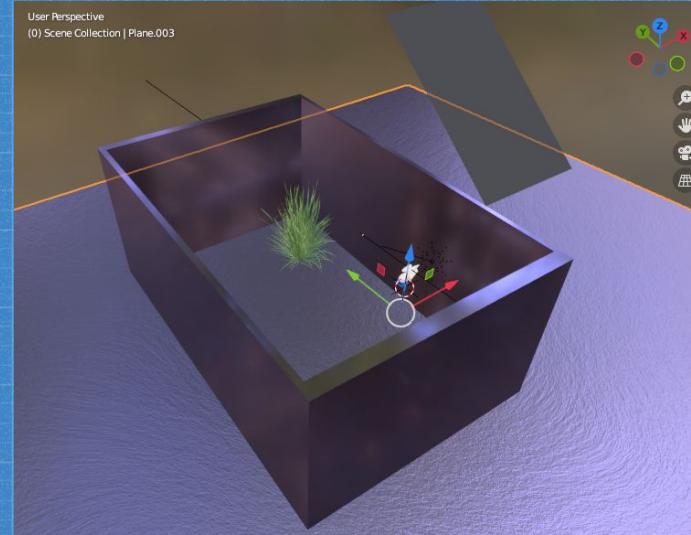
translucence



pearlescence and  
subsurface scattering

# Some creative choices

## Recoloring, Layout of scene



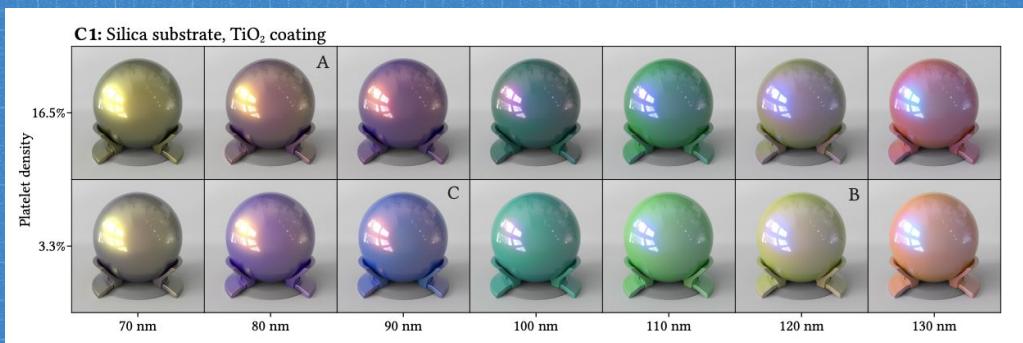
## pbrt experimentation

- Created a custom material: augment the pbrt substrate material to take in opacity image maps
- Pretty promising results, switched to blender for more convenient editing of uv maps and modeling
- most work using materials previously implemented in Blender

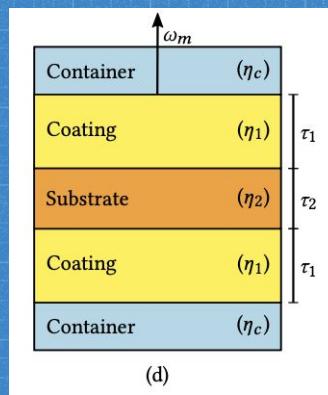


## Future work

- Create a new BSSRDF to simulate a more precise pearlescence model
- Create library of pearlescent materials for different platelet orientations and coatings
- Improve rig and uv mapping + try glowing particles!



Zaragoza, Ibón Guillén Universidad de, et al. "A General Framework for Pearlescent Materials." *ACM Transactions on Graphics (TOG)*, 1 Dec. 2020.



# Friedrich! :D





Q & A