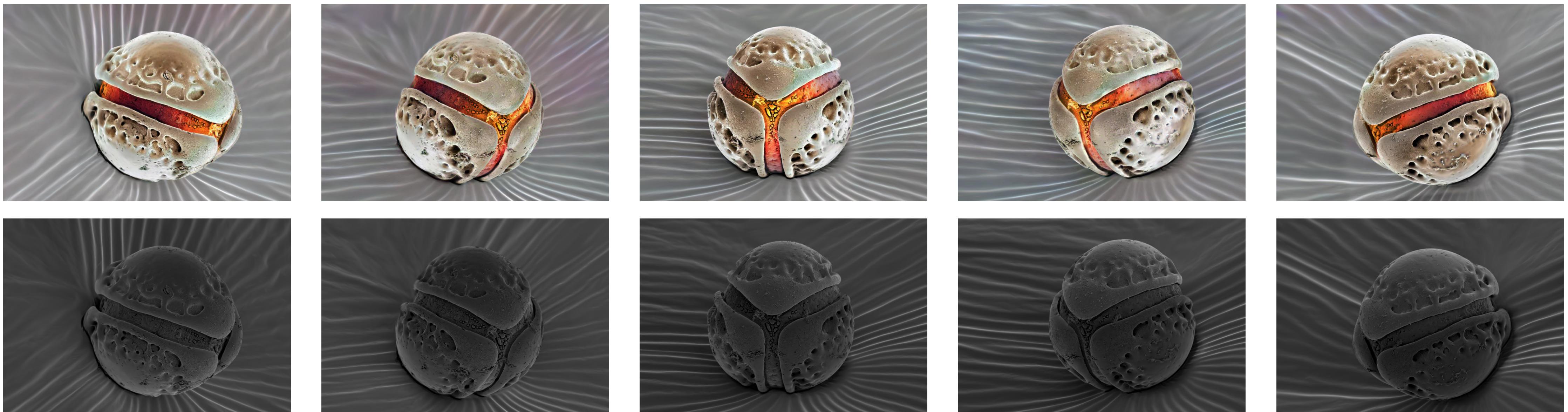
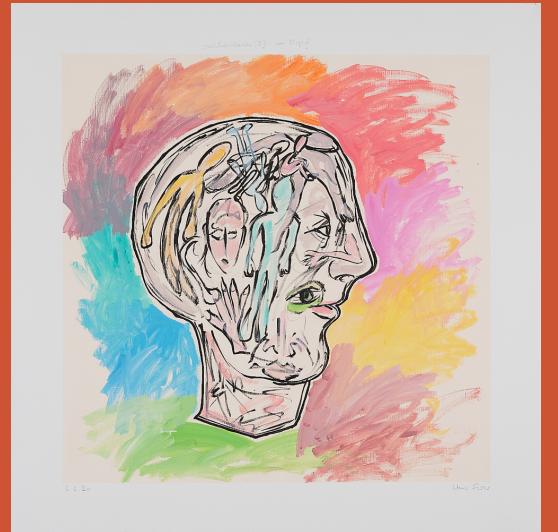


# ArCSEM: Artistic Colorization of SEM Images via Gaussian Splatting

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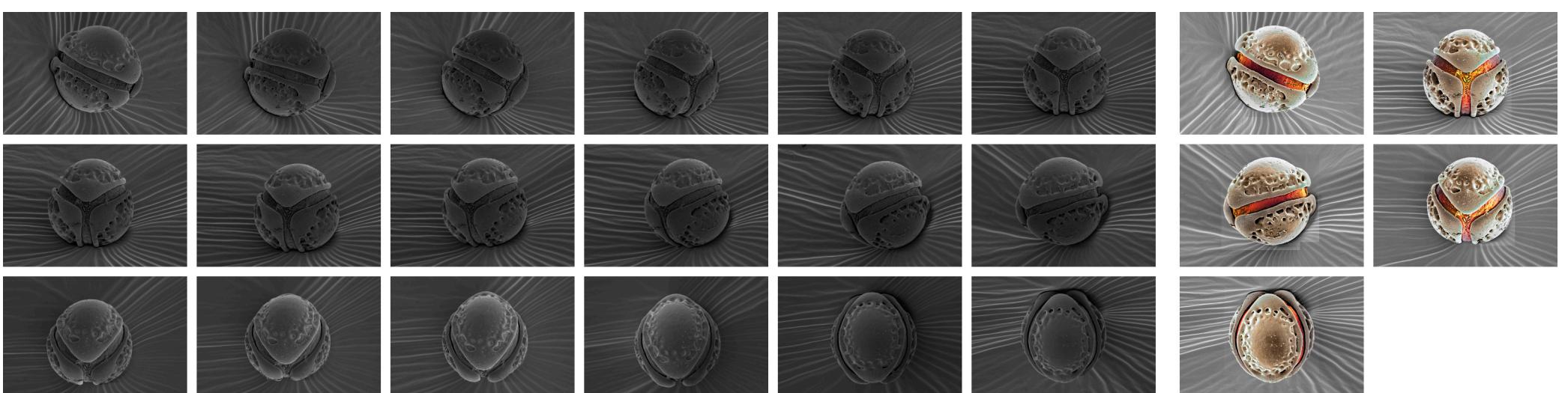
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## Summary

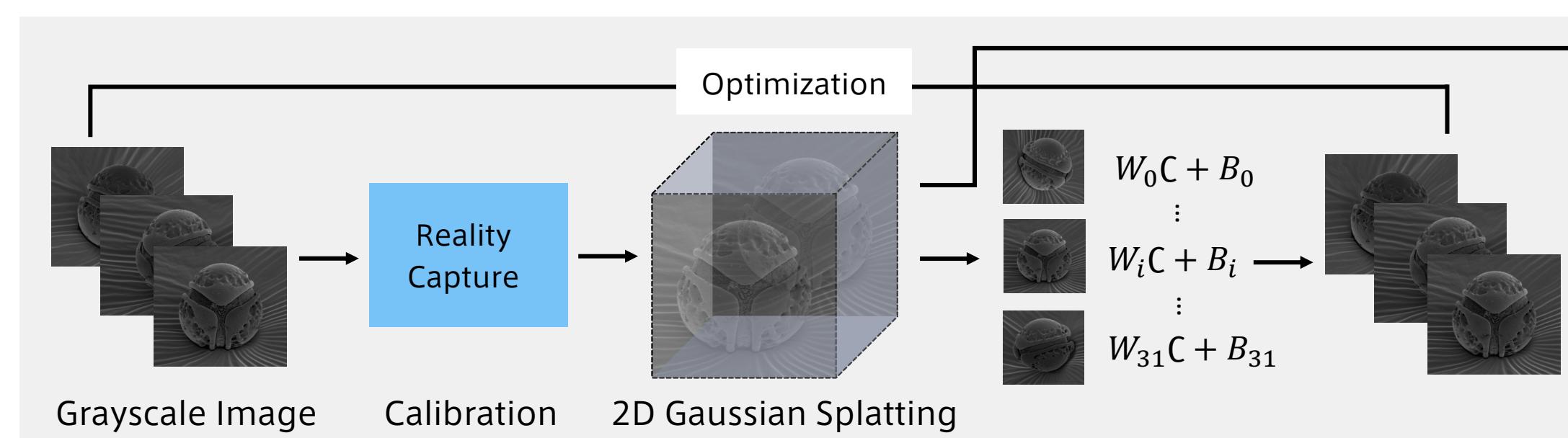
- **What?**: Novel View Synthesis & Conditional 3D Colorization of Scanning Electron Microscopic images.
- **Why?**: Before, complex methods and manual interaction were necessary for novel view synthesis and colorization of 3D SEM object.
- Challenges: Multi-view SEM images are grayscale, have different illumination, follow an orthogonal projection and contain fine details. Our aim is multi-view consistent colorization.

## Training Dataset (Pollen)

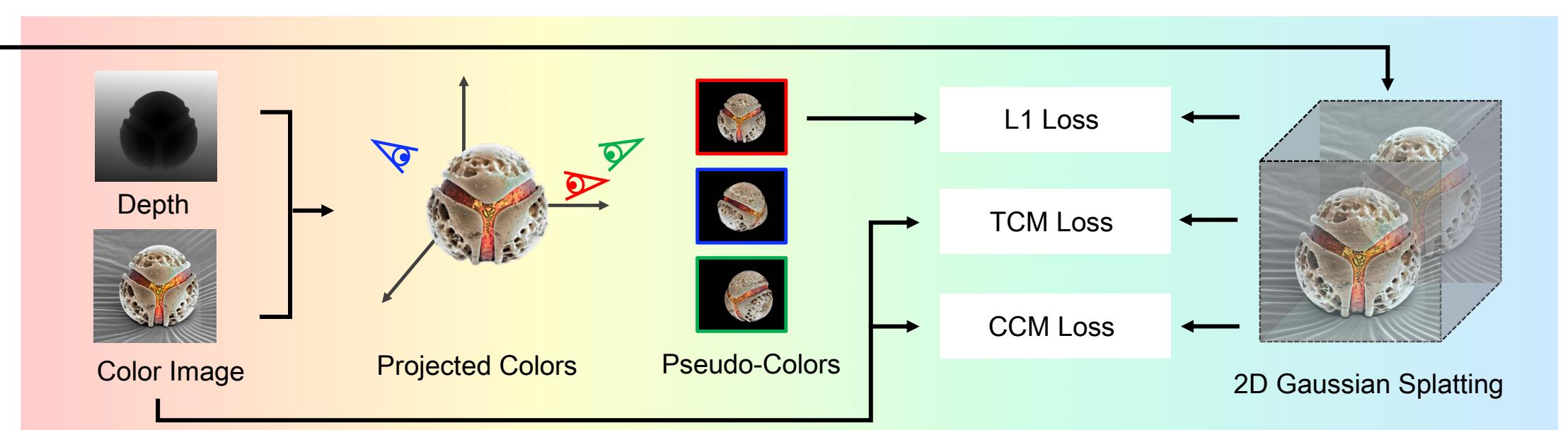


- Grayscale: 32 images (lateral and vertical directions)
- Color: 5 images, colorized by an artist Martin Oeggerli.

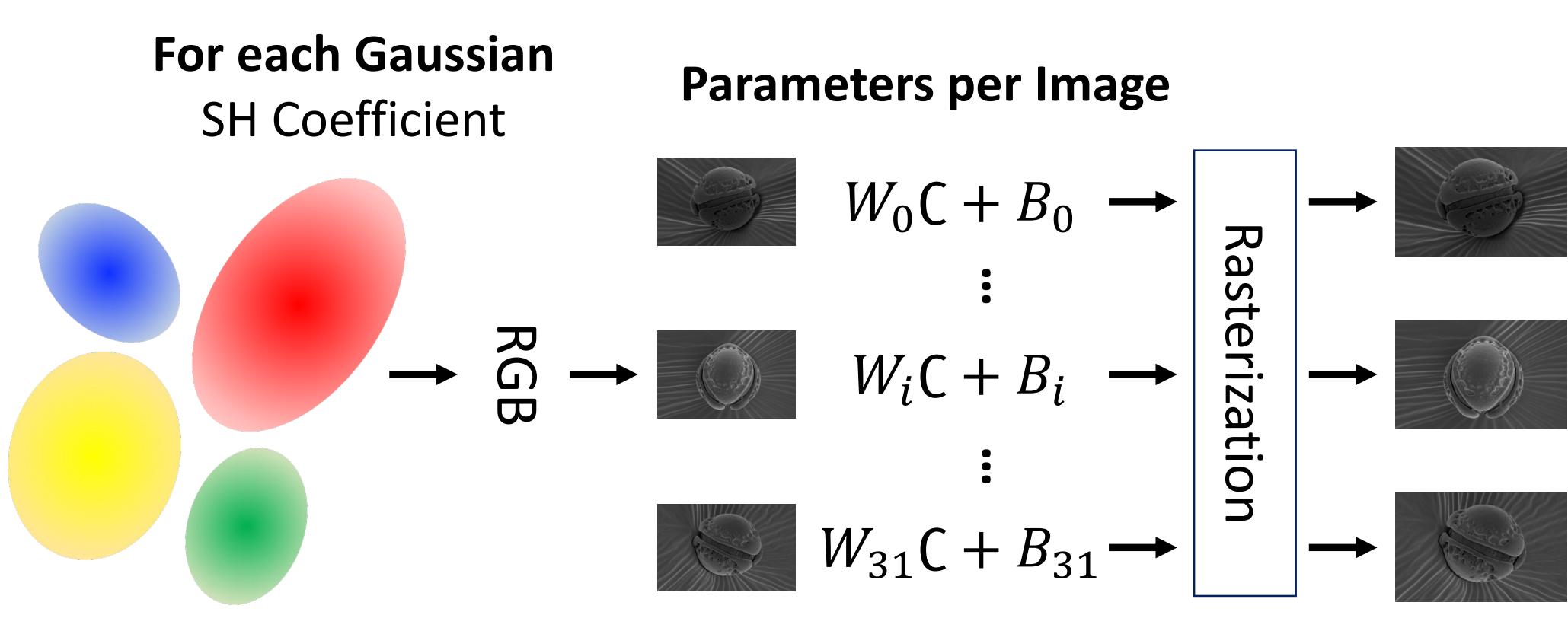
## Method



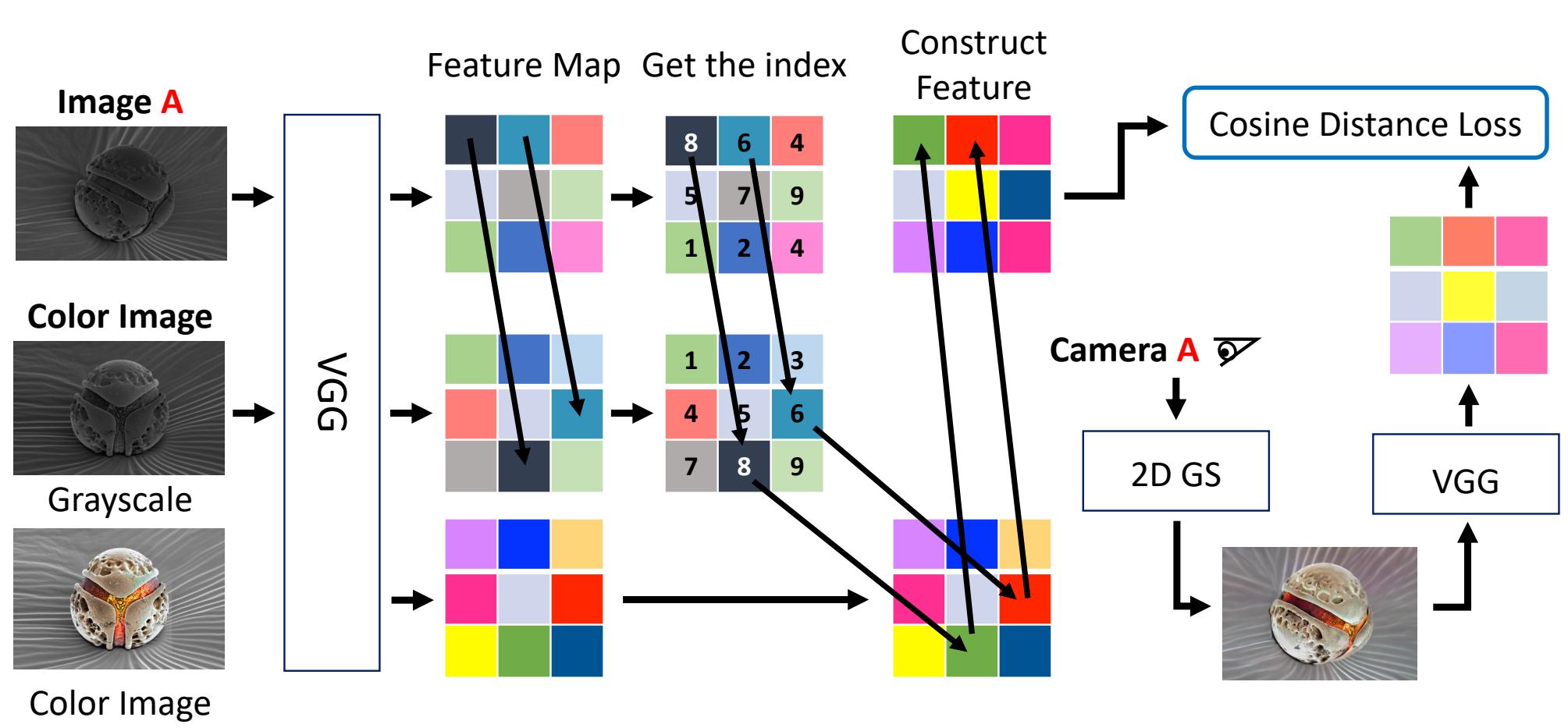
- Calibration: Simulate orthogonal projection with perspective projection using a longer focal length (approx. 50k pixels).
- Model: 2D Gaussian Splatting with image-specific **Affine Color Transformation** (see below) for different illumination.



- Pseudo colors: Project colors onto 3D space take the nearest colors for each ray.
- Occluded area: **Template Correspondence Module** (see below) by Ref-NPR.
- Global color consistency: Coarse-Color Matching loss.



Robust Gaussian Splatting François Darmon, Lorenzo Porzi, Samuel Rota-Bulò, Peter Kortschieder



Ref-NPR: Reference-Based Non-Photorealistic Radiance Fields for Controllable Scene Styling, Zhang, Yuechen and He, Zixin and Xing, Jinbo and Yao, Xufeng and Jia, Jiaya

## Results

