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Supporting Information for

Image Denoising Techniques Applied to Glow Discharge Optical Emission Spectroscopy Elemental Mapping

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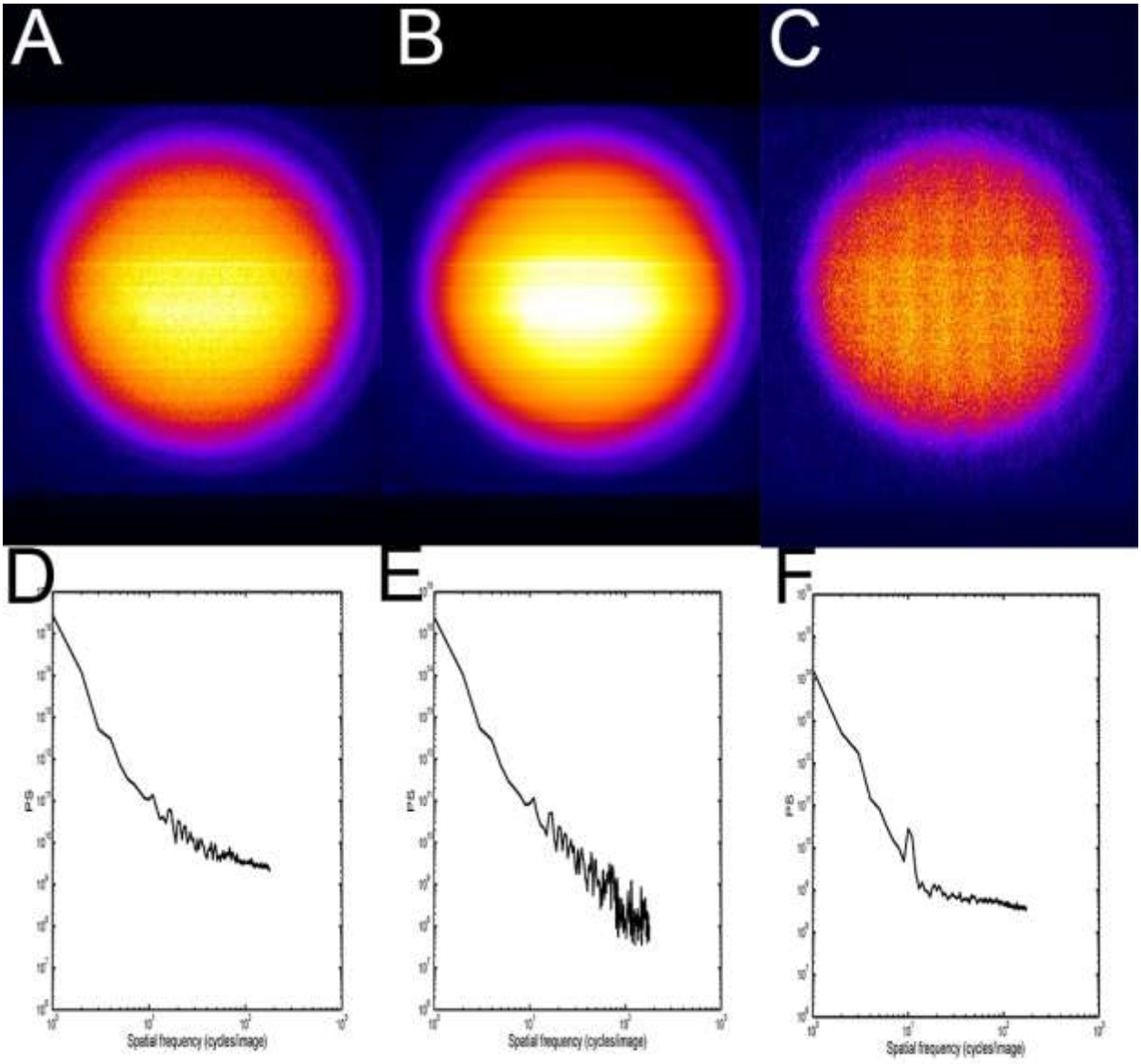

Figure 1S. Single image (A) and average of 100 images (B) of 338.3nm GDOES emission from a homogeneous Ag sample with their corresponding rotationally averaged power spectra (D and E). C) Single image of 341.5nm GDOES emission from a homogeneous Ni sample when system is used with faulty gas bottle regulator and its corresponding rotationally averaged power spectrum (F).

The following protocol was followed for PCA analysis of datasets in this study:

1. Each single GDOES image was converted into m-by-n matrix with the row and column elements representing the intensity of the pixels.
2. The matrix was reshaped into a single column matrix along the existing columns (mxn, 1).
3. The column matrices of the image stacks were concatenated horizontally into a larger matrix which is equivalent to stacking the image slices on top of each other.
4. This large matrix was mean centered and PCA analysis was performed. The variance captured by each of the principal components was calculated.
5. The insignificant principal components were removed and the data was retransformed back into the original form to obtain image slices with improved signal-to noise ratio.

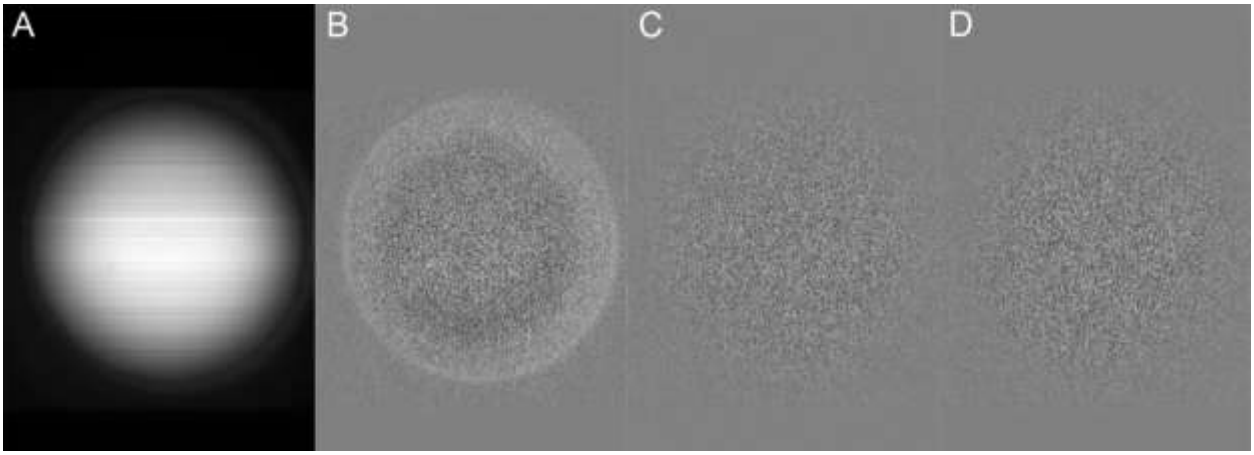

Figure 2S. Reconstructed images of GDOES elemental map at 338.3nm from a homogeneous Ag sample after PCA treatment of 20 raw images using only principal component 1(a), principal component 2 (b), principal component 3 (c), and principal component 4 (d). Only results from the first image in the stack have been shown. Figs (c) and (d) seem to capture random variation in the dataset.

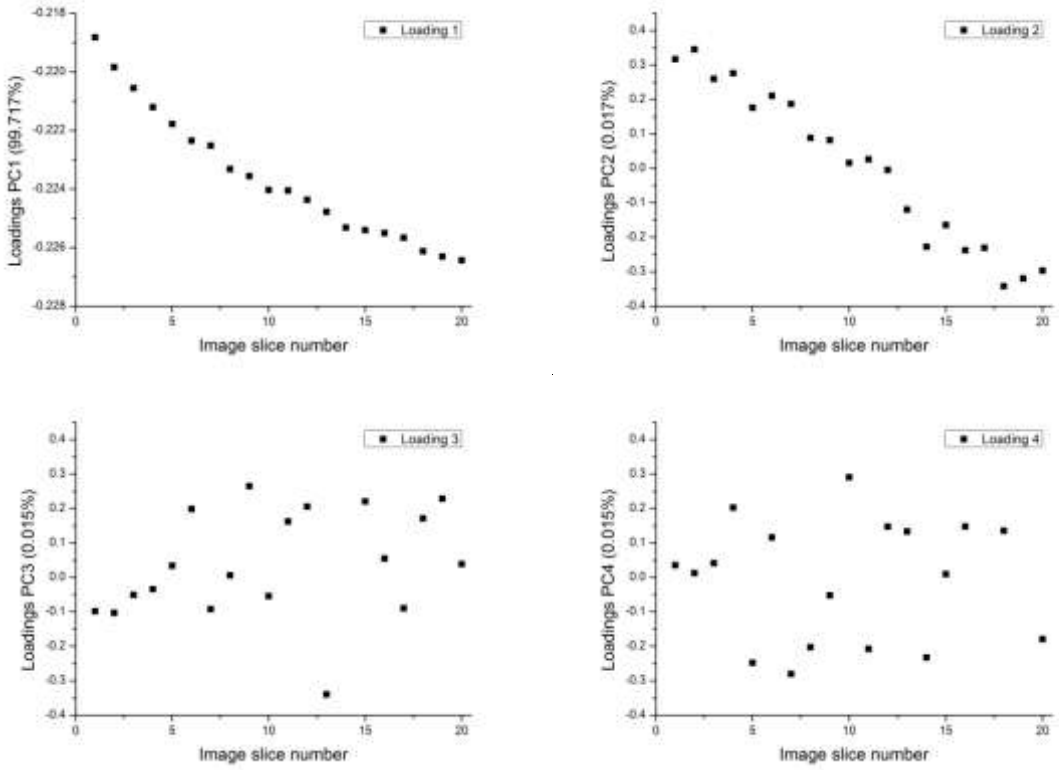

Figure 3S. Loading plots of PCA applied to 20 GDOES elemental maps at 338.3nm from a homogeneous Ag sample corresponding to PC1, PC2, PC3, and PC4. The percentage of variance captured by each PC is shown in brackets. PCs 3 and 4 exhibit random variation confirming that these two PCs capture mainly noise.

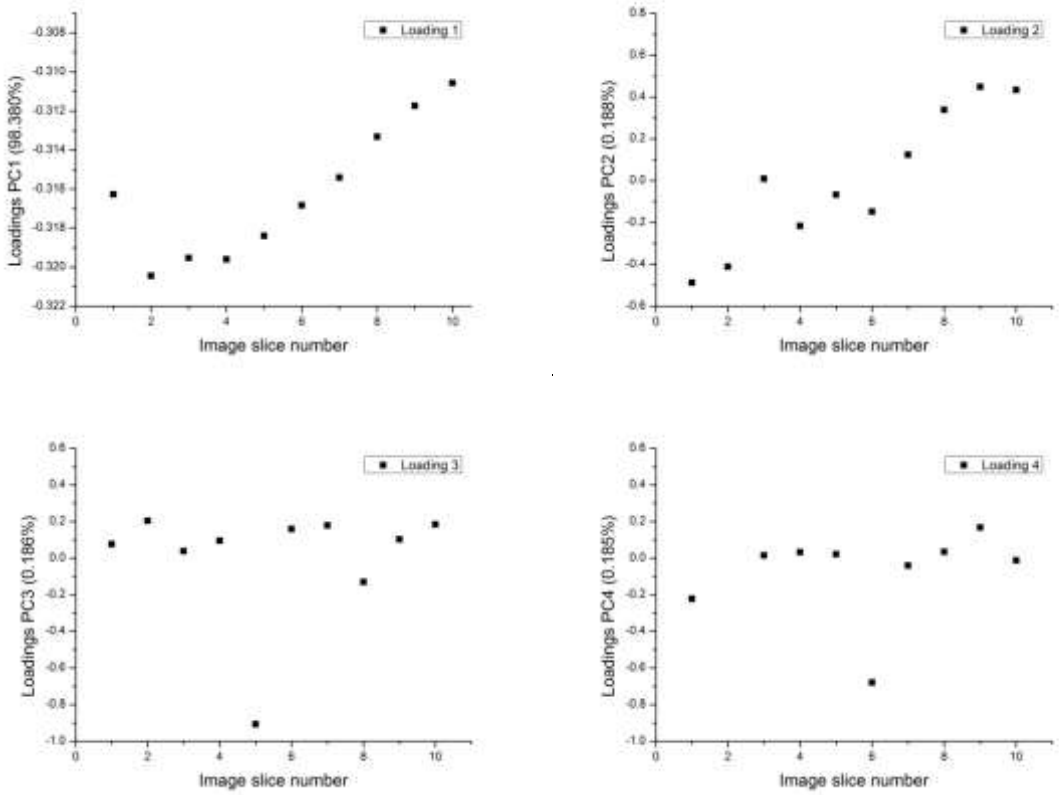

Figure 4S. Loading plots of PCA applied to 10 GDOES elemental maps at 324.7nm from a perforated Ag film on a Cu substrate sample corresponding to PC1 (a), PC2 (b), PC3 (c), and PC4 (d). Only results from the first image in the stack have been shown.

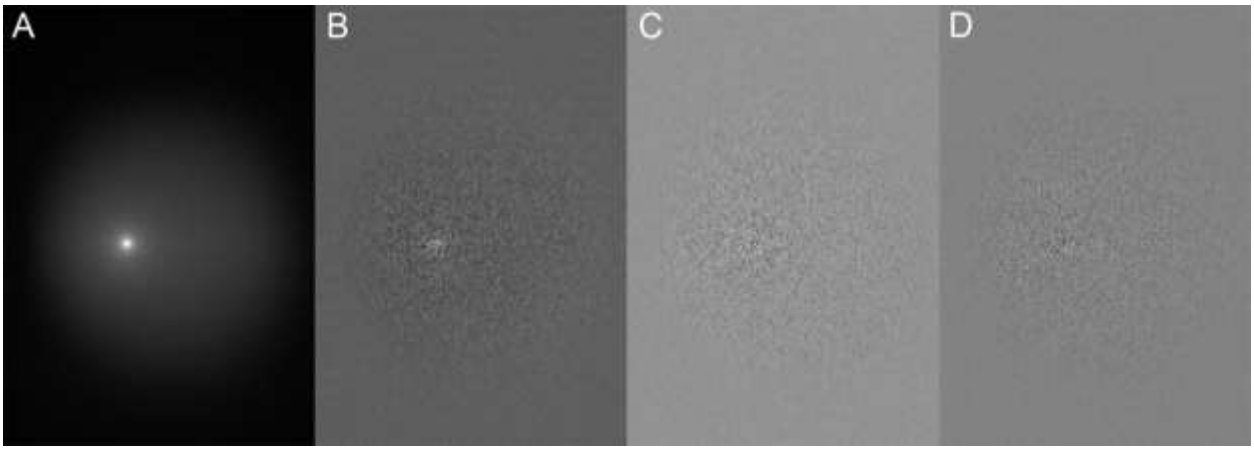

Figure 5S. Reconstructed images of GDOES elemental map at 324.7nm from a perforated Ag film on a Cu substrate sample after PCA treatment of 10 raw images using only principal component 1(a), principal component 2 (b), principal component 3 (c), and principal component 4 (d).