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Electronic Supplementary Information (ESI)

## High-Throughput Single Pixel Spectral Imaging System For Glow Discharge Optical

## Emission Spectrometry Elemental Mapping Enabled by Compressed Sensing

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factor. The effect of the sparsifying basis/reconstruction algorithm were also studied: DCT/TwIST (♦), DWT/TwIST (●), DCT/GPSR (▲), DWT/GPSR (■).



Figure S2. Fidelity characterization, in terms of PSNR (A) and SSIM (B), of GDOES EM CSSPIS reconstructed images at 2048 matrix density as a function of compression factor. The effect of the sparsifying basis/reconstruction algorithm were also studied: DCT/TwIST (♦), DWT/TwIST (●), DCT/GPSR (▲), DWT/GPSR (■).



Figure S3. Cameraman image used for CSSPIS simulation experiments in its original format and after addition of 50 dbW SNR with the Matlab "awgn" function.



Figure S4. Fidelity characterization, in terms of PSNR (A) and SSIM (B), of computer simulated CSSPIS reconstructed images at 1024 matrix density as a function of compression factor. The effect of the sparsifying basis/reconstruction algorithm were also studied: DCT/TwIST (♦), DWT/TwIST (●), DCT/GPSR (▲), DWT/GPSR (■).



Figure S5. Fidelity characterization, in terms of PSNR (A) and SSIM (B), of computer simulated CSSPIS reconstructed images at 2048 matrix density as a function of compression factor. The effect of the sparsifying basis/reconstruction algorithm were also studied: DCT/TwIST (♦), DWT/TwIST (●), DCT/GPSR (▲), DWT/GPSR (■).