

Supporting Information

Denoising Stimulated Raman Spectroscopic Images by Total Variation Minimization

Chien-Sheng Liao^{#,1}, Joon Hee Choi^{#,2}, Delong Zhang^{#,1},

Stanley H. Chan^{*2,3}, Ji-Xin Cheng^{*1,2,4,5,6}

¹Weldon School of Biomedical Engineering, ²School of Electrical and Computer Engineering, ³Department of Statistics, ⁴Department of Chemistry, ⁵Purdue University Center for Cancer Research, ⁶Birck Nanotechnology Center, Purdue University, West Lafayette, IN 47907, USA

equal contributions

*corresponding authors

Supporting Figures

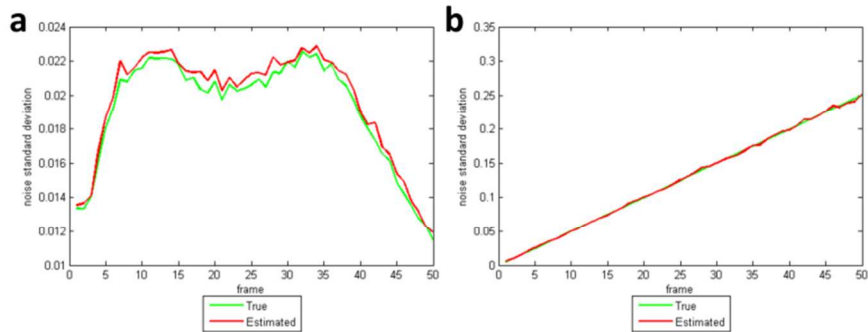


Figure S1: Noise estimation by STV algorithm. The true noise level was in green and the estimated noise level was in red. The x-axis was the frame number. The y-axis was the normalized noise level defined as the standard deviation of the background, where we normalized the signal to the interval [0, 1]. Each value shown on the y-axis corresponded to the percentage of noise compared to the signal level. (a) and (b) were corresponding to two different spectrally varying noise patterns.

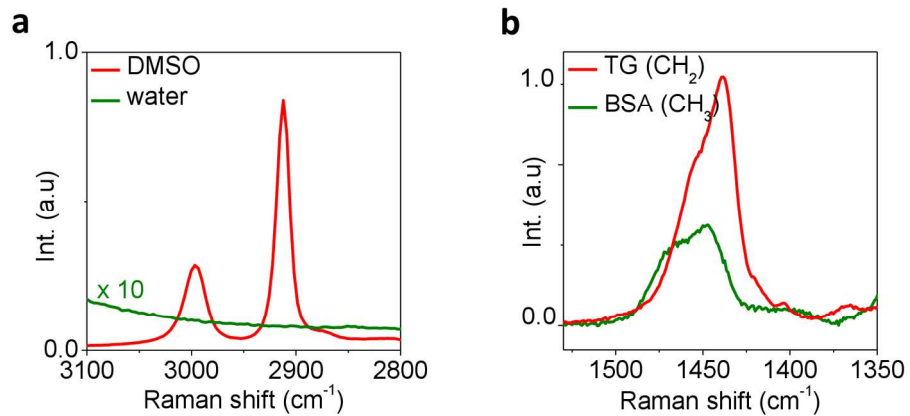


Figure S2: The spontaneous Raman spectra of (a) 100% DMSO solution and water. (b) Triglyceride (rich in CH_2) and bovine serum albumin (rich in CH_3).

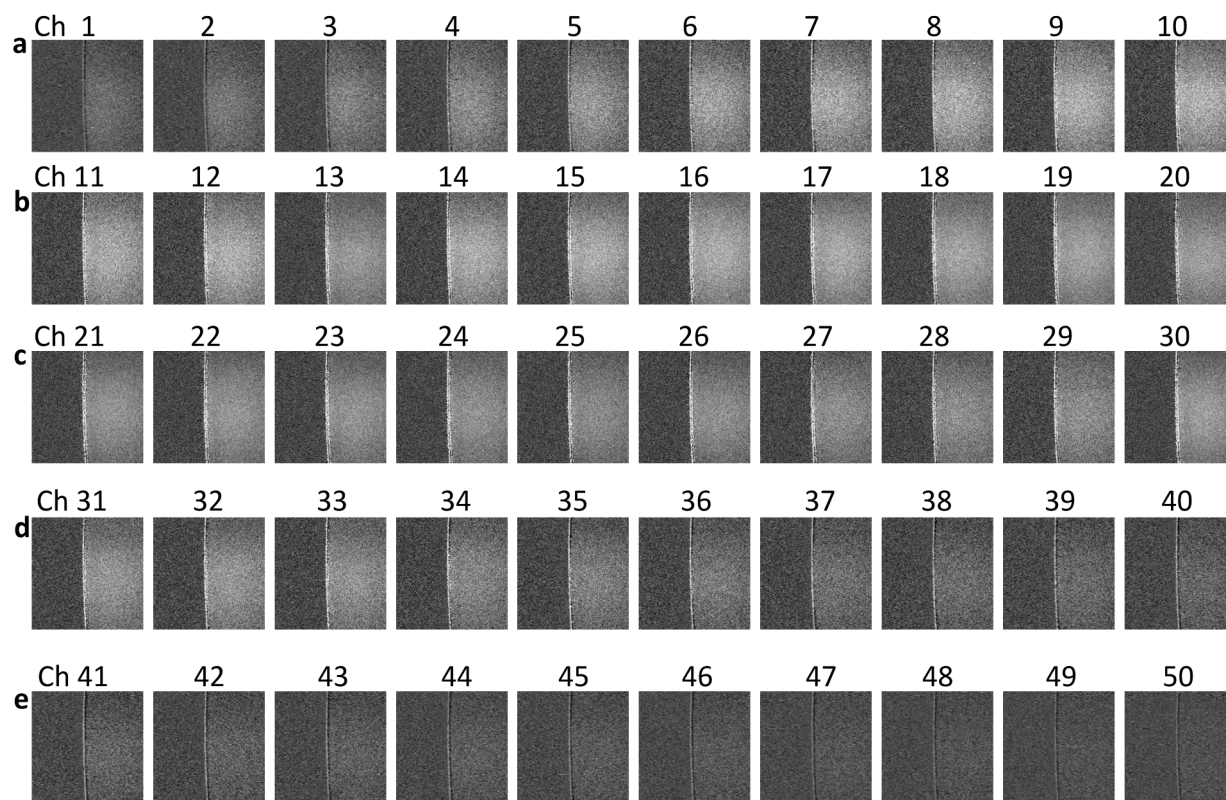


Figure S3: Raw spectroscopic images of 0.2% DMSO solution and air interface. (a) Spectral channel 1~8. (b) Channel 9~16. (c) Channel 17~24. (d) Channel 25~32.

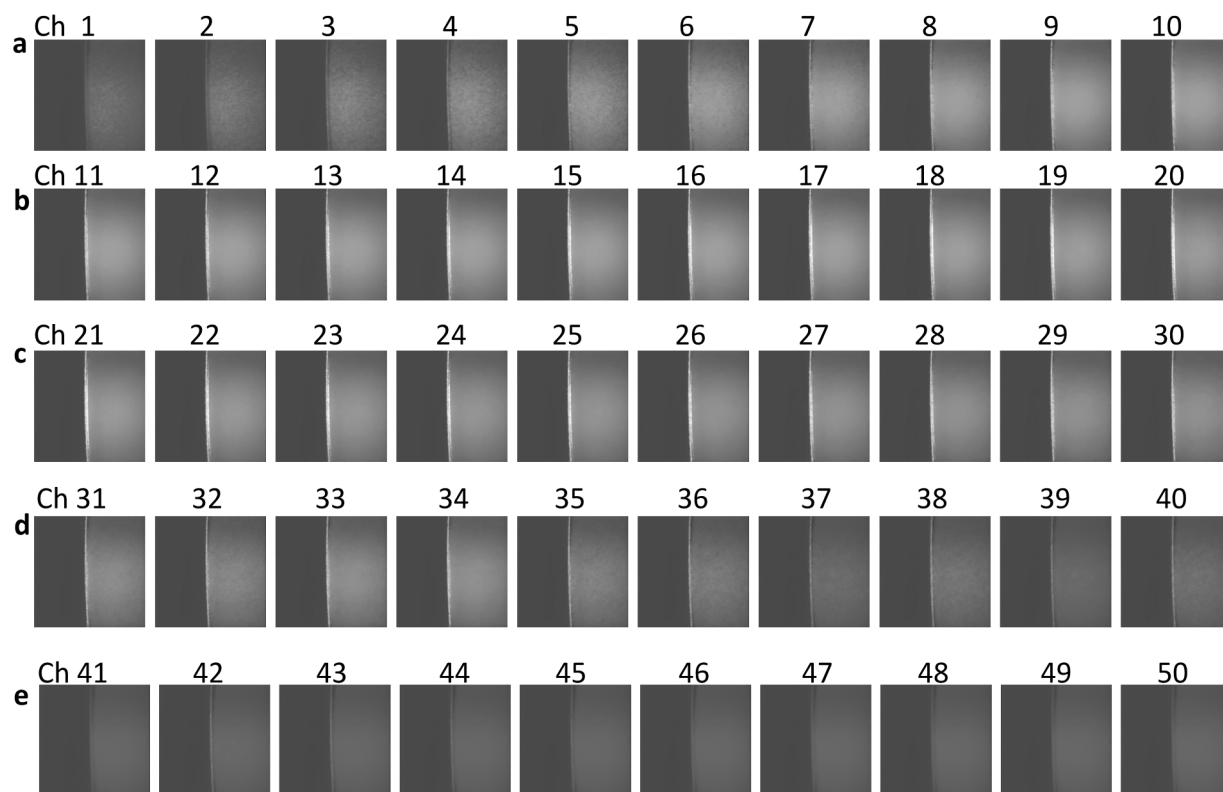


Figure S4: Denoised spectroscopic images of 0.2% DMSO solution and air interface by STV. (a) Spectral channel 1~10. (b) Channel 11~20. (c) Channel 21~30. (d) Channel 31~40. (e) Channel 41~50.

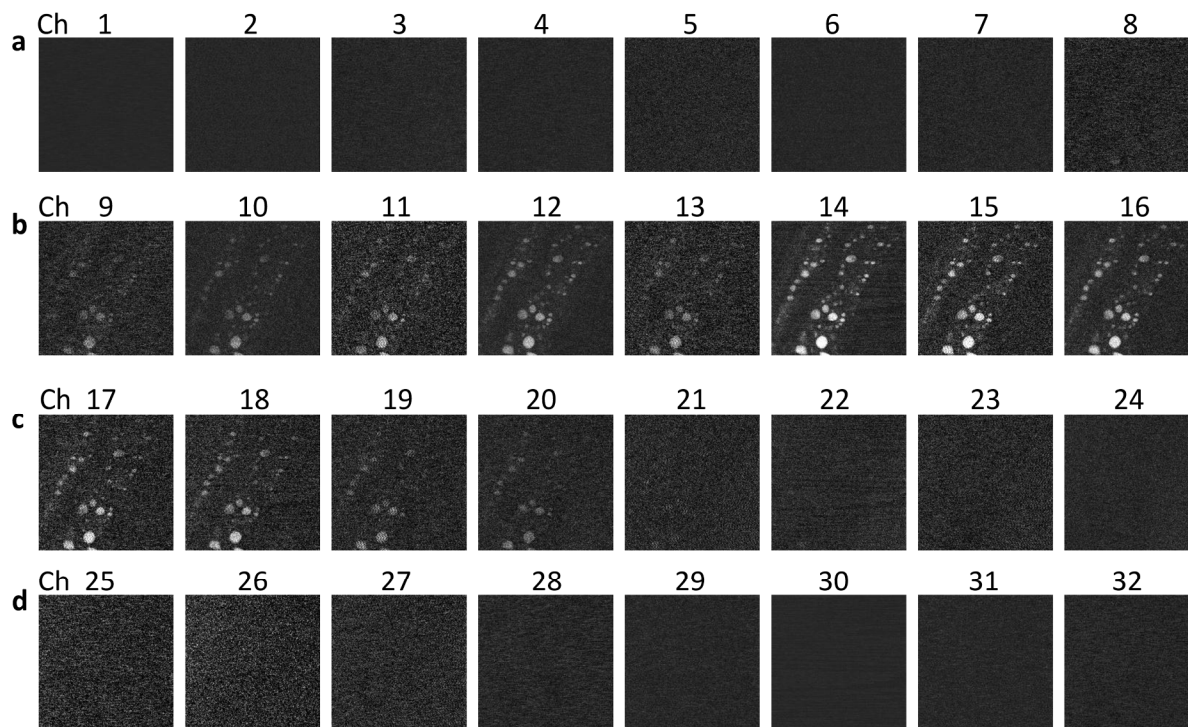


Figure S5: Raw spectroscopic images of *C. elegans*. (a) Spectral channel 1~8. (b) Channel 9~16. (c) Channel 17~24. (d) Channel 25~32.

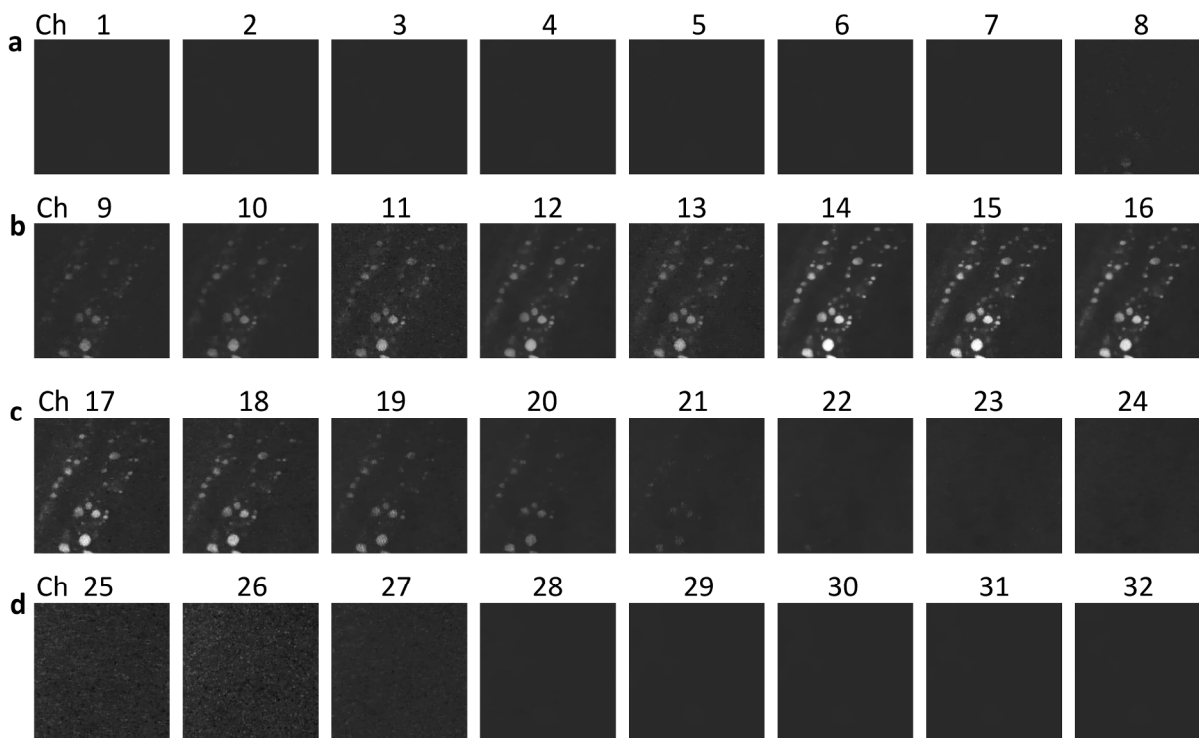


Figure S6: Denoised spectroscopic images of *C. elegans* by STV. (a) Spectral channel 1~8. (b) Channel 9~16. (c) Channel 17~24. (d) Channel 25~32.

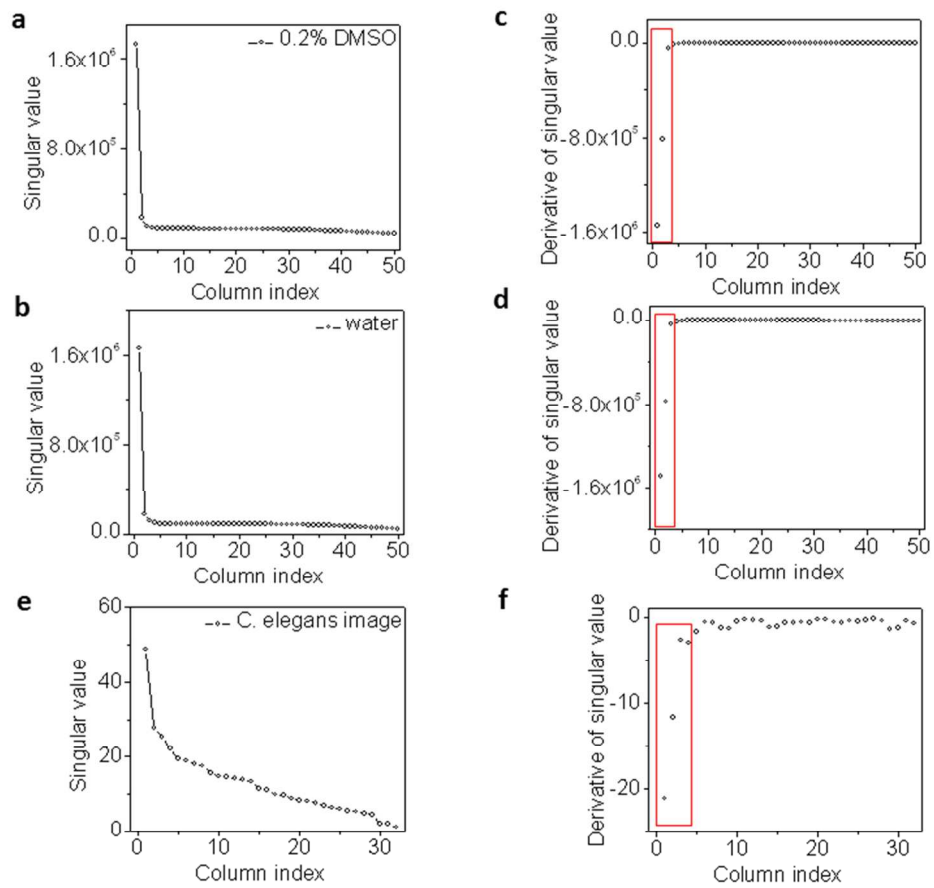


Figure S7: Singular values of SRS spectroscopic images of (a) 0.2% DMSO solution. (b) Derivative of (a). (c) water. (d) Derivative of (c). (e) *C. elegans*. (f) Derivative of (e)

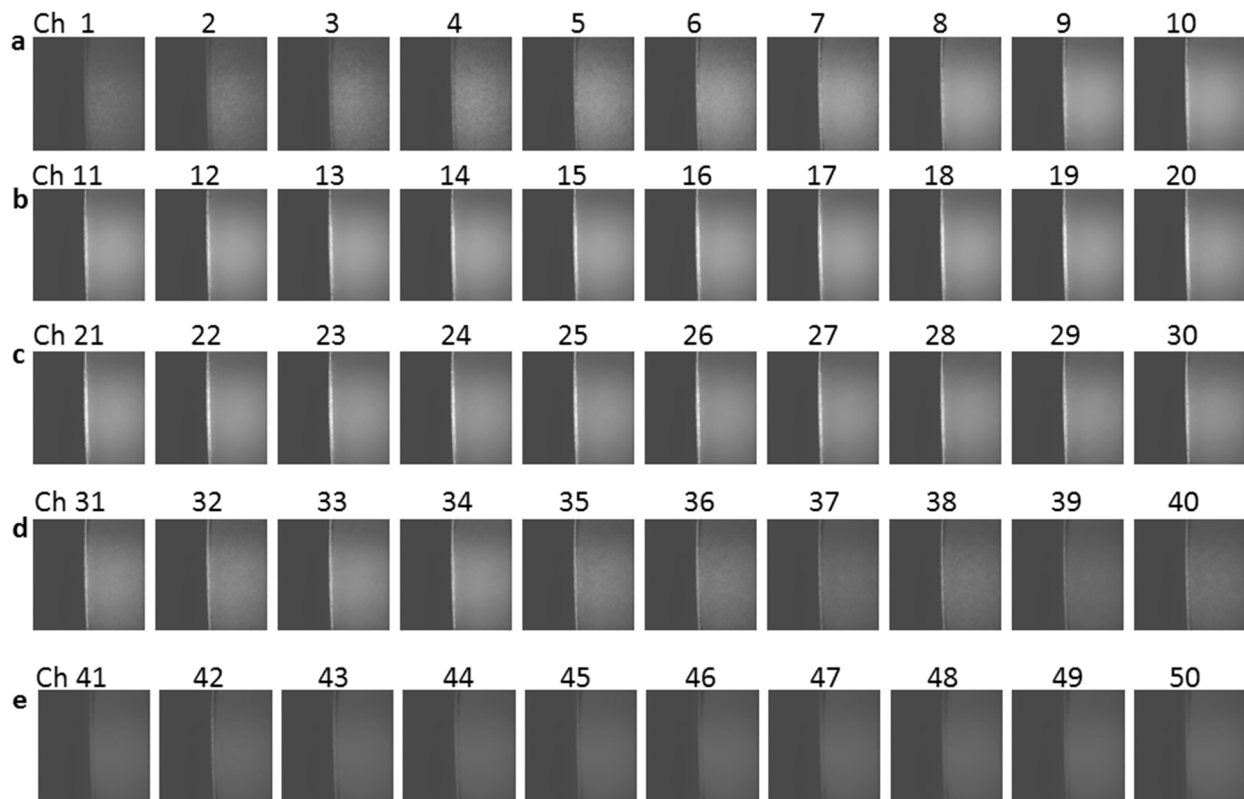


Figure S8: Denoised spectroscopic images of 0.2% DMSO solution and air interface by SVD. (a) Spectral channel 1~10. (b) Channel 11~20. (c) Channel 21~30. (d) Channel 31~40. (e) Channel 41~50.

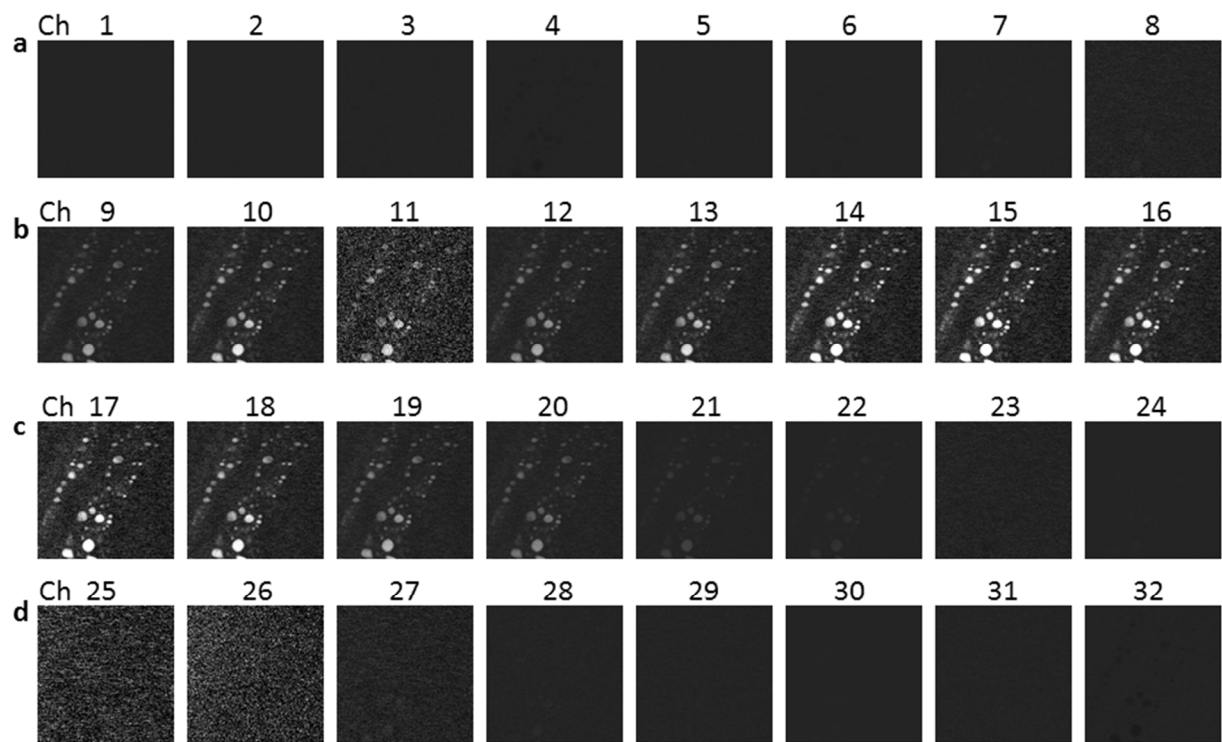


Figure S9: Denoised spectroscopic images of *C. elegans* by SVD. (a) Spectral channel 1~8. (b) Channel 9~16. (c) Channel 17~24. (d) Channel 25~32.