Electronic Supplementary Material (ESI) for Analyst.
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Supporting Information for: "Fast Raman imaging through the combination of context-aware matrix completion and low spectral resolution"

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1. Synthetically expanding measurement data for CARMC reconstruction algorithm

As described in the main text, directly applying the matrix factorization method to a measurement matrix such as that shown in Fig. S1(a), below, will result in errors in the reconstruction process. When an entire column of data is set to 0, the Moore-Penrose pseudo-inverse, required as part of the reconstruction, will yield divide-by-0 errors. To avoid this, the measurement matrix is synthetically extended beyond the true measurement region, as shown in Fig. S1(b). To "fill in" regions of M within the synthetically extended measurement region, the value of each synthetic point is filled in as its nearest neighbor in the actual measured area.

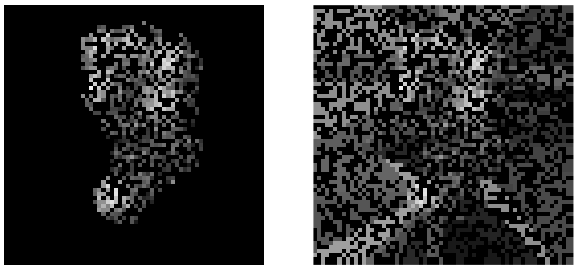

Fig.S1 (a) original measurement matrix M. (b) the synthetically extended measurement matrix.

Armed with the synthetically extended measurement matrix, the traditional MC reconstruction algorithm can be directly applied to the data. Then, following reconstruction, the values of the reconstructed image in the synthetic area are re-set to 0.

2. Point-scan and MC imaging of high-resolution and four low-resolution Raman spectra

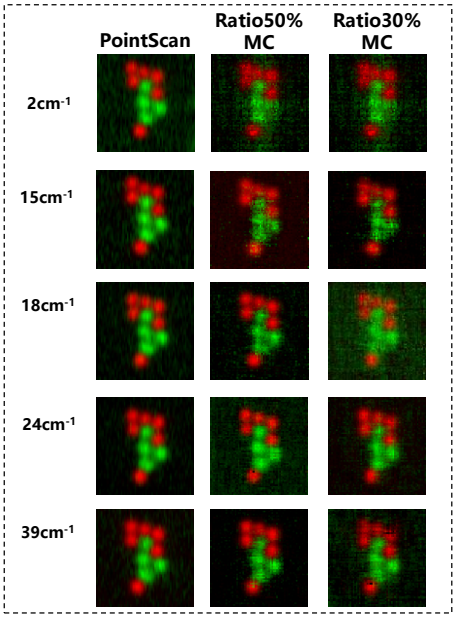

Fig.S2 Point-scan and MC imaging results of high-resolution and four low-resolution 1umPS and and PMMA microsphere mixes with an exposure time of 0.1s. Note that the first and fourth rows recapitulate the imaging results shown in Fig. 3A in the main text.