Supplementary figures 18 through 21

for

Image fusion of mass spectrometry and microscopy: a new multi-modality paradigm for molecular mapping of tissue

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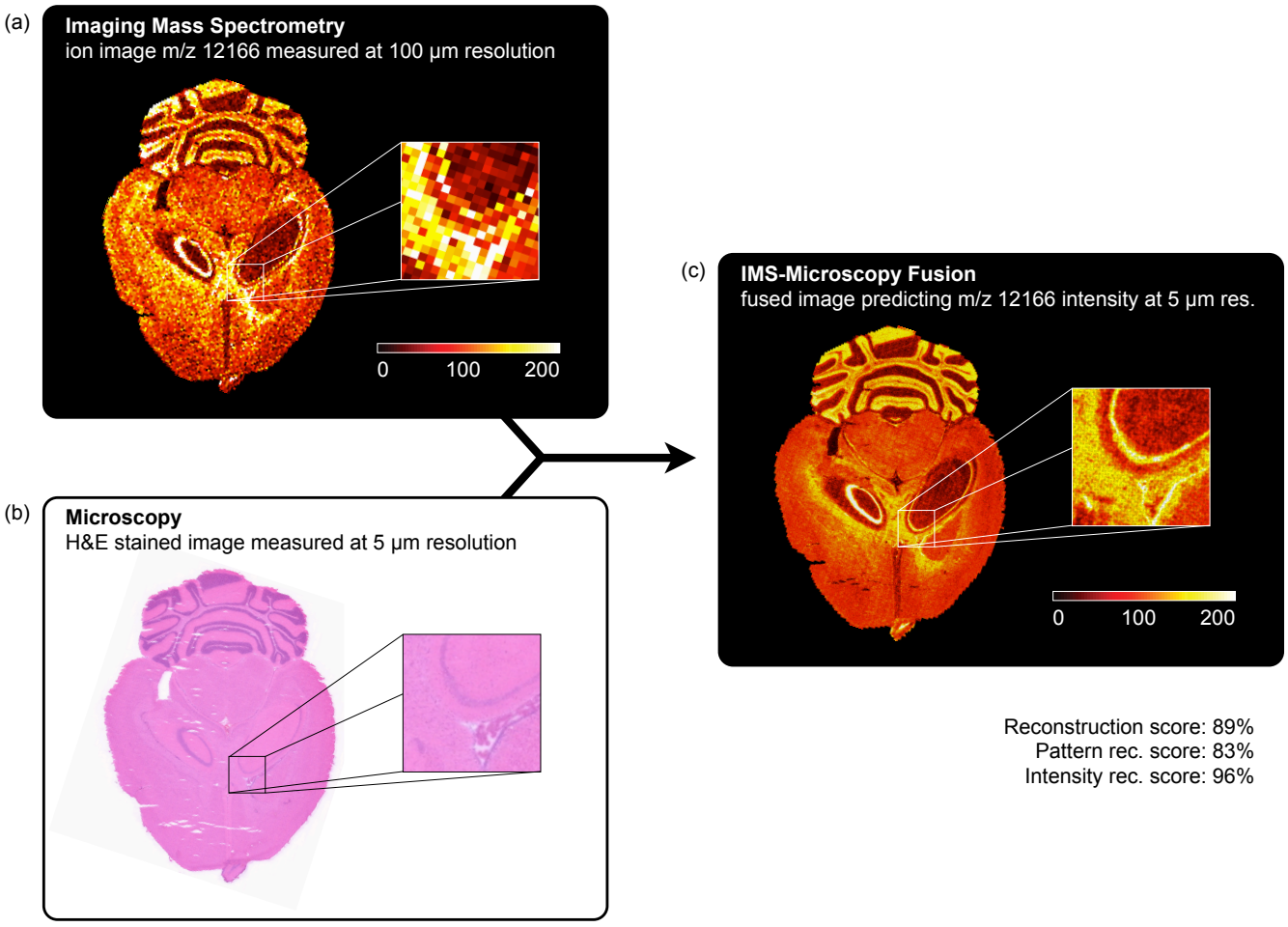
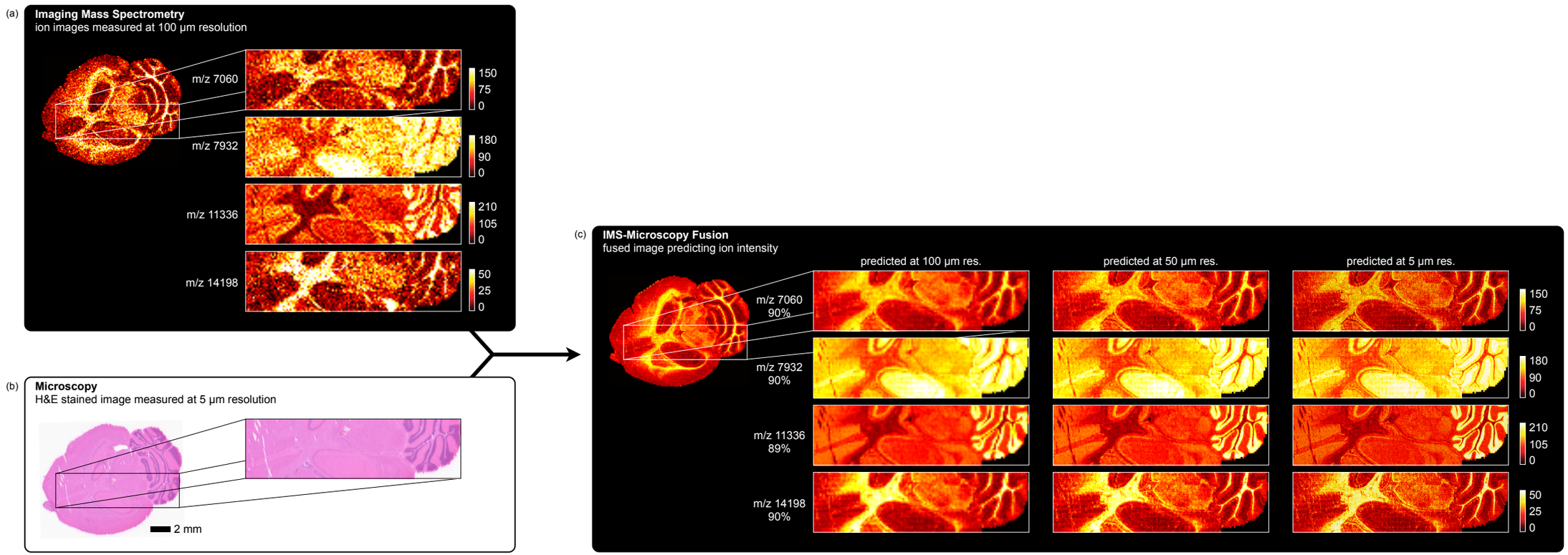
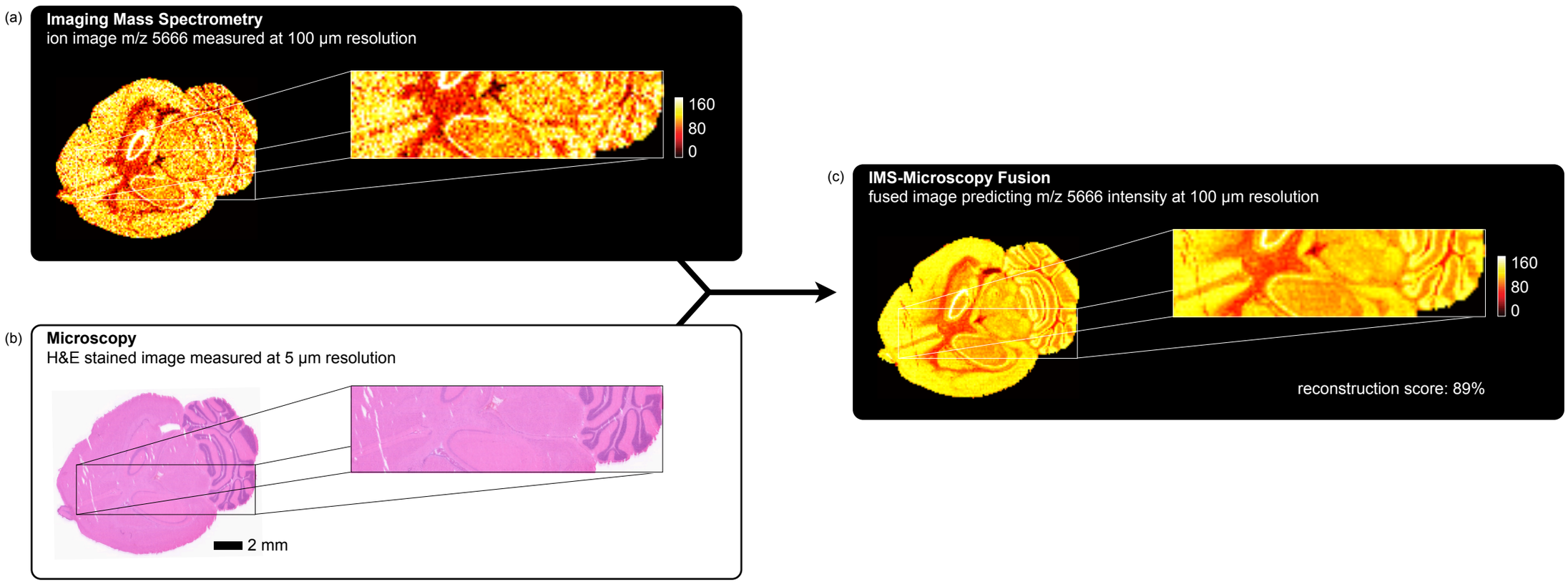


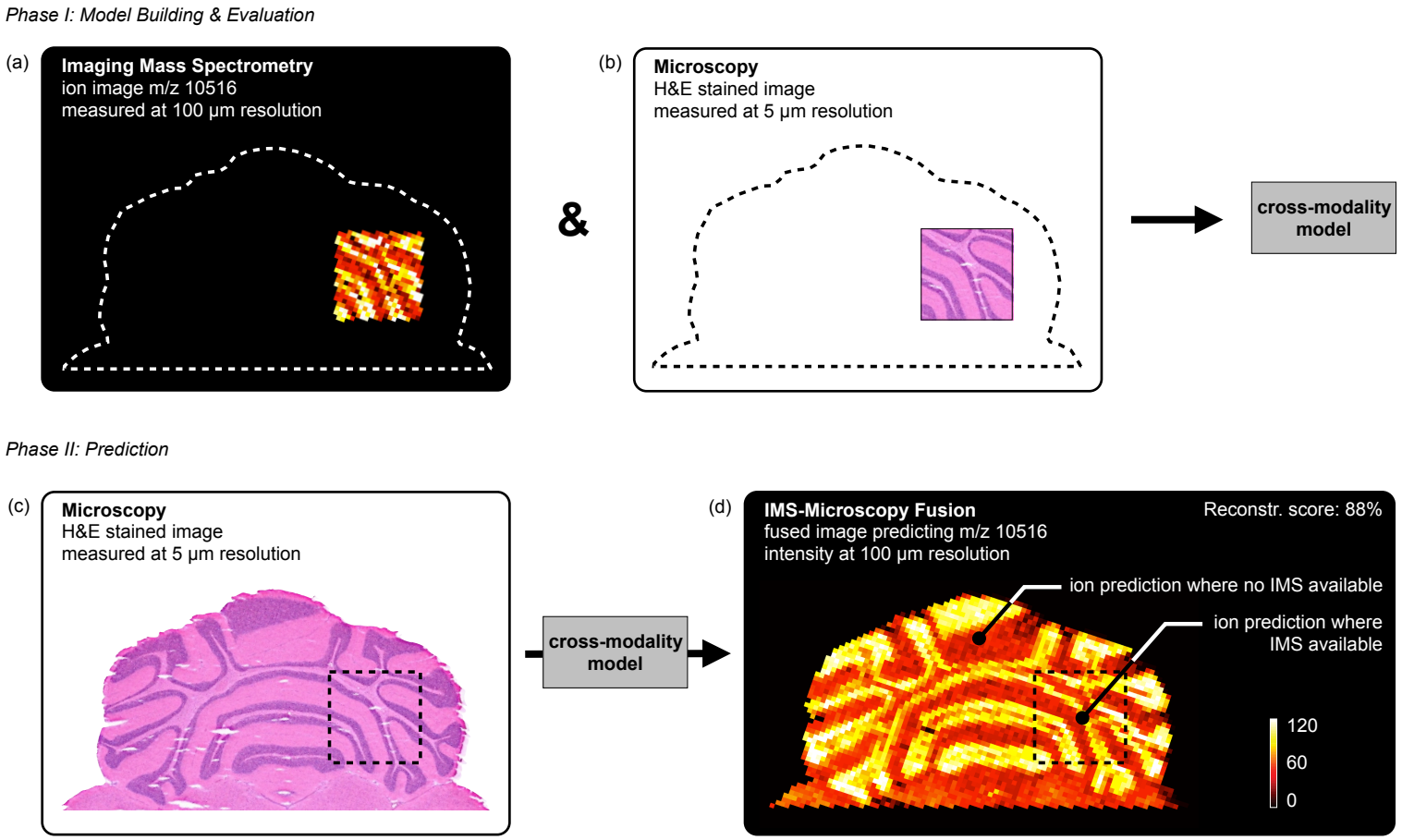
Supplementary Figure 18 Prediction of the ion distribution of m/z 12,166 in mouse brain at 5 µm resolution from 100 µm IMS and 5 µm microscopy measurements (sharpening). This example in mouse brain fuses a measured ion image for m/z 12,166 at 100 µm spatial resolution (**a**) with a measured H&E-stained microscopy image at 5 µm resolution (**b**), predicting the ion distribution of m/z 12,166 at 5 µm resolution (reconstr. score 89%) (**c**).



Supplementary Figure 19 Prediction of the ion distributions of m/z 7,060, 7,932, 11,336, and 14,198 in mouse brain at different target resolutions from 100 µm IMS and 5 µm microscopy measurements (sharpening). An IMS/microscopy model fuses information from ion images for m/z 7,060, 7,932, 11,336, and 14,198, measured at 100 µm spatial resolution (**a**), with that of an H&E-stained microscopy image measured at 5 µm resolution (**b**). Combined with the microscopy measurements, the fusion model is then used to predict the ion distribution of m/z 7,060, 7,932, 11,336, and 14,198 at 100, 50, and 5 µm resolution (**c**) (reconstr. score 90%, 90%, 89%, and 90% respectively).



Supplementary Figure 20 De-noising of the ion distribution of m/z 5,666 in mouse brain through round-trip prediction from 100 µm IMS to 100 µm fused resolution, using fusion to 5 µm microscopy measurements as a filter (de-noising). This example in mouse brain fuses a measured ion image for m/z 5,666 at 100 µm spatial resolution (**a**) with a measured H&E-stained microscopy image at 5 µm resolution (**b**), predicting the ion distribution of m/z 5,666 at 100 µm resolution (reconstr. score 89%) (**c**). No sharpening is pursued. The objective is to use fusion to employ microscopy measurements as a filter. This filtering application retains cross-modal (tissue) variation and removes modality-specific variation.



Supplementary Figure 21 Prediction of m/z 10,516 distribution at native IMS resolution (without sharpening) in mouse brain areas not measured by IMS. An IMS/microscopy model is built on a tissue sub-area for which IMS is available at 100 µm resolution (**a**) and H&E-stained microscopy is available at 5 µm resolution (**b**). The model is then used to predict the distribution of m/z 10,516 at 100 µm resolution in areas where no IMS was acquired and only microscopy is available (reconstr. score 88%) (**d**).