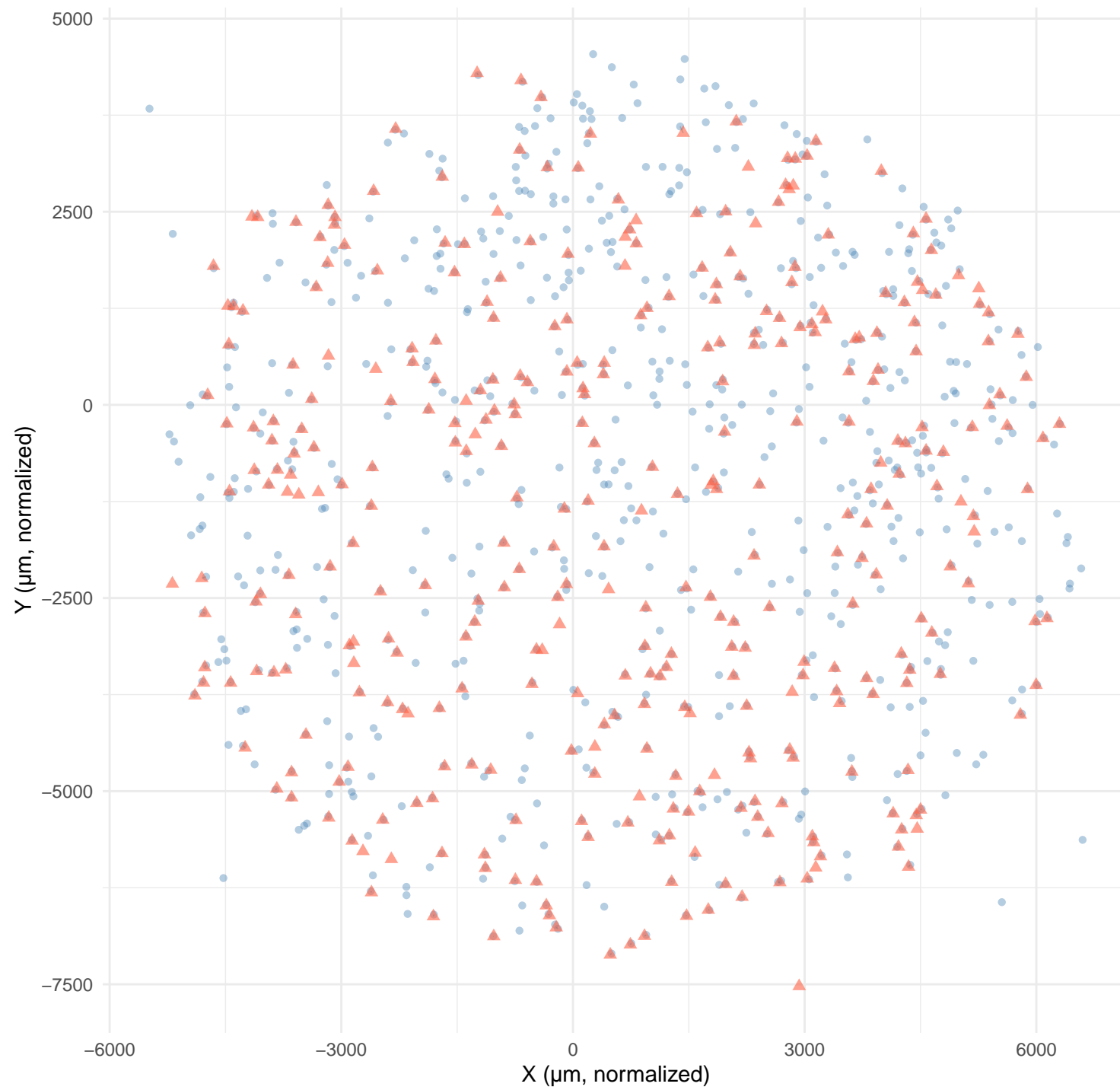


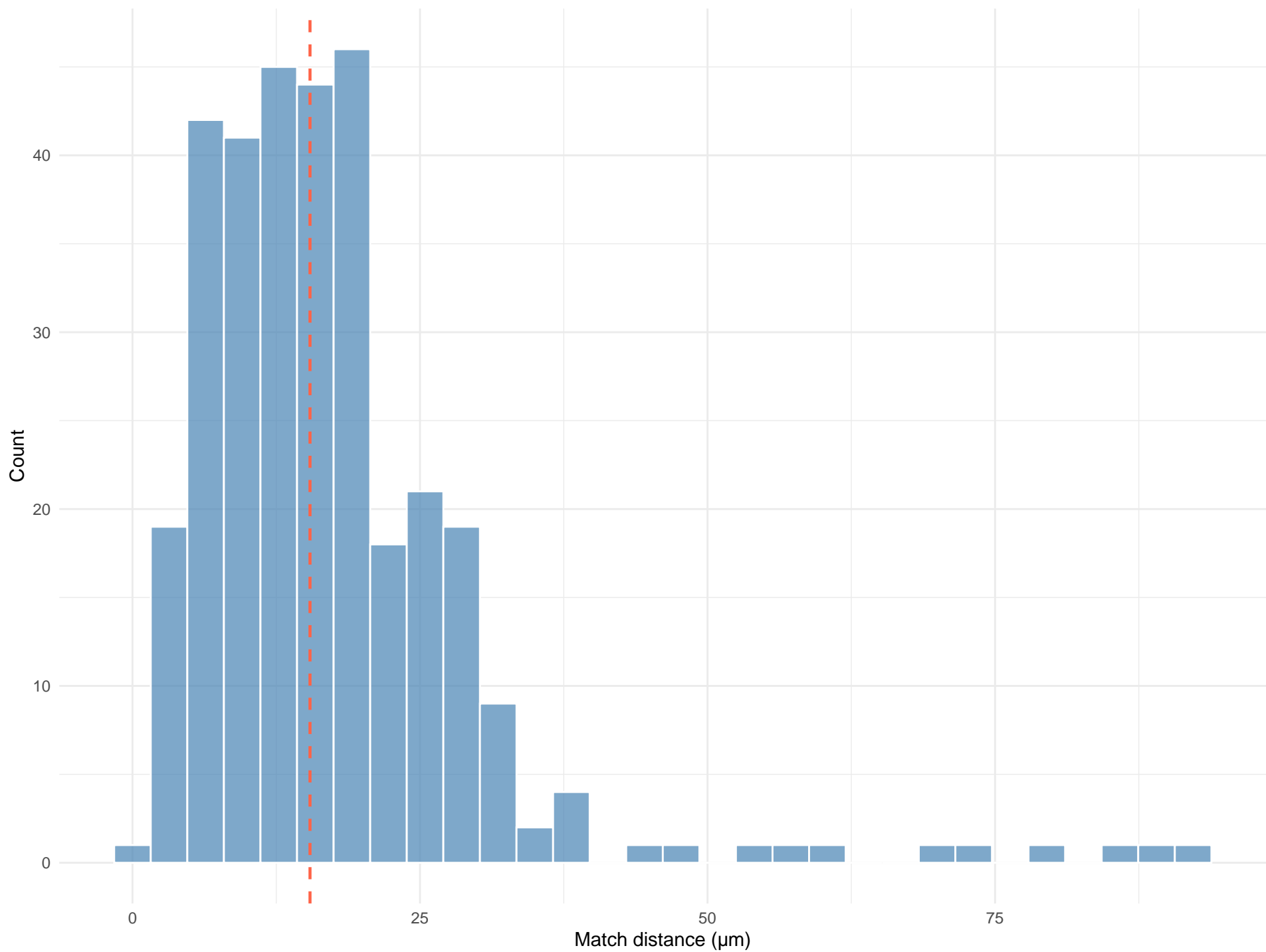
# FTIR...Raman Particle Overlay (aligned coordinates)

Red triangles = FTIR, Blue circles = Raman, Lines = matched pairs

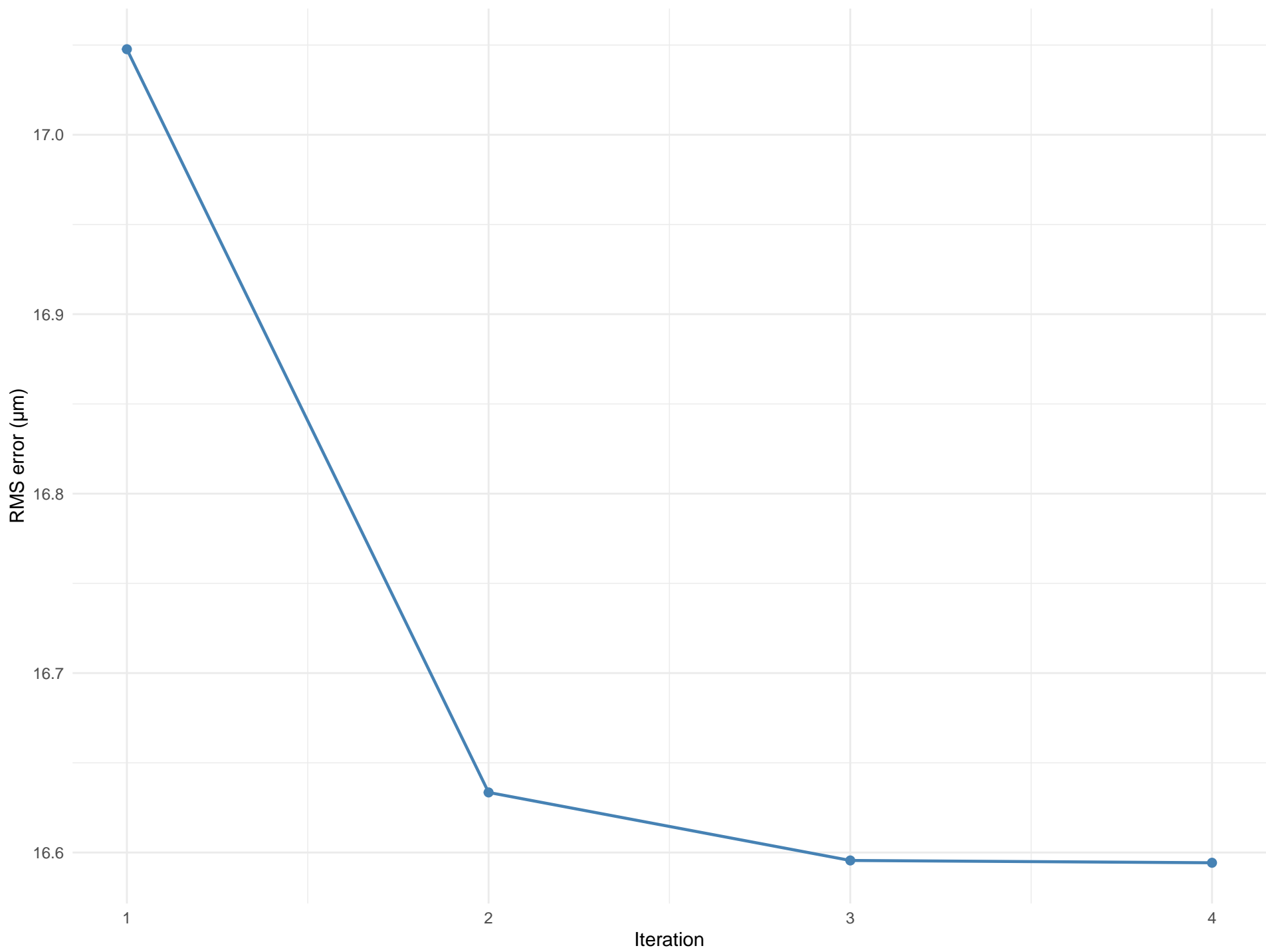


# Match Distance Distribution

Median = 15.44  $\mu\text{m}$ , n = 322 pairs

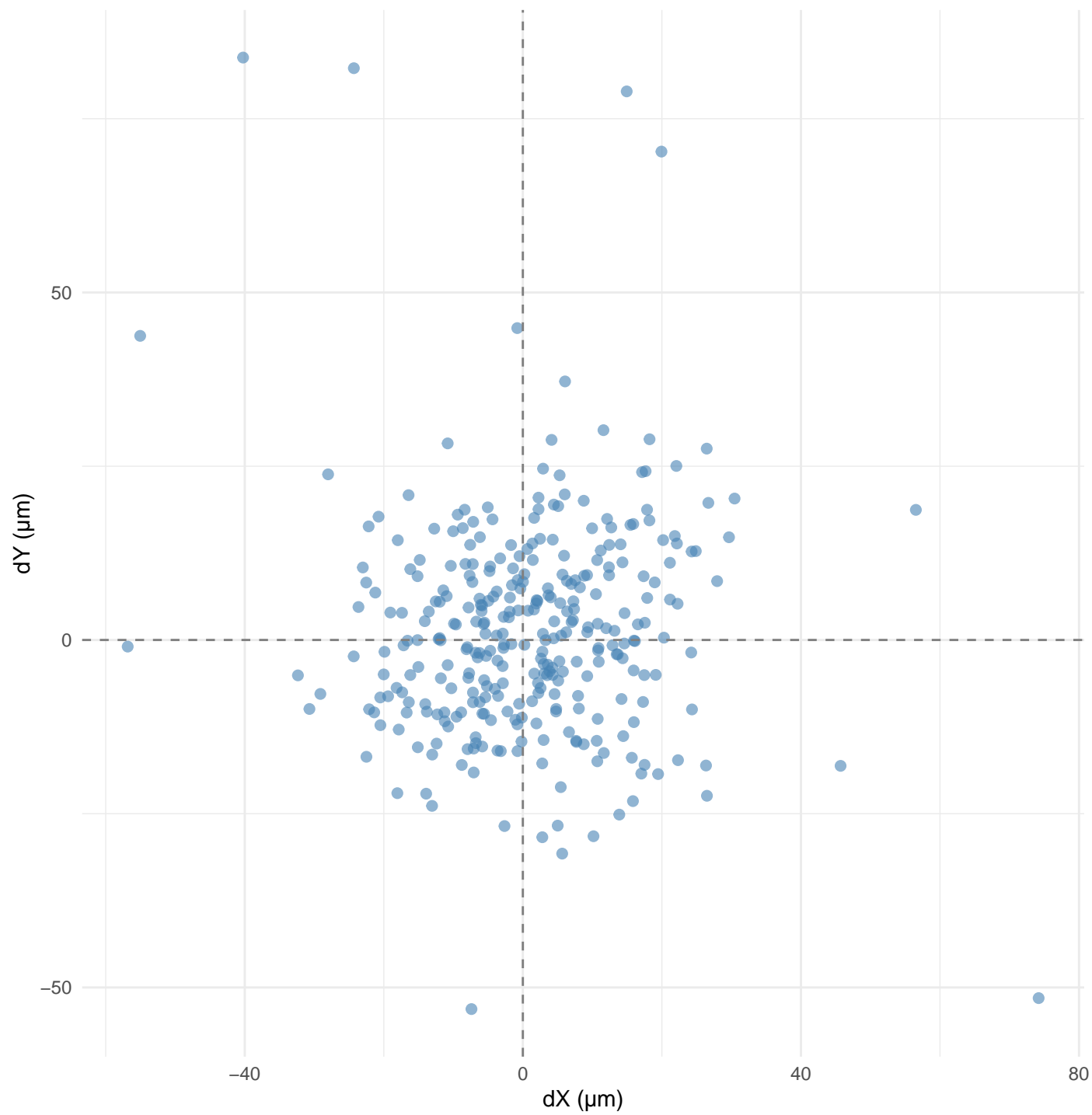


ICP Convergence  
Converged: TRUE, Iterations: 4



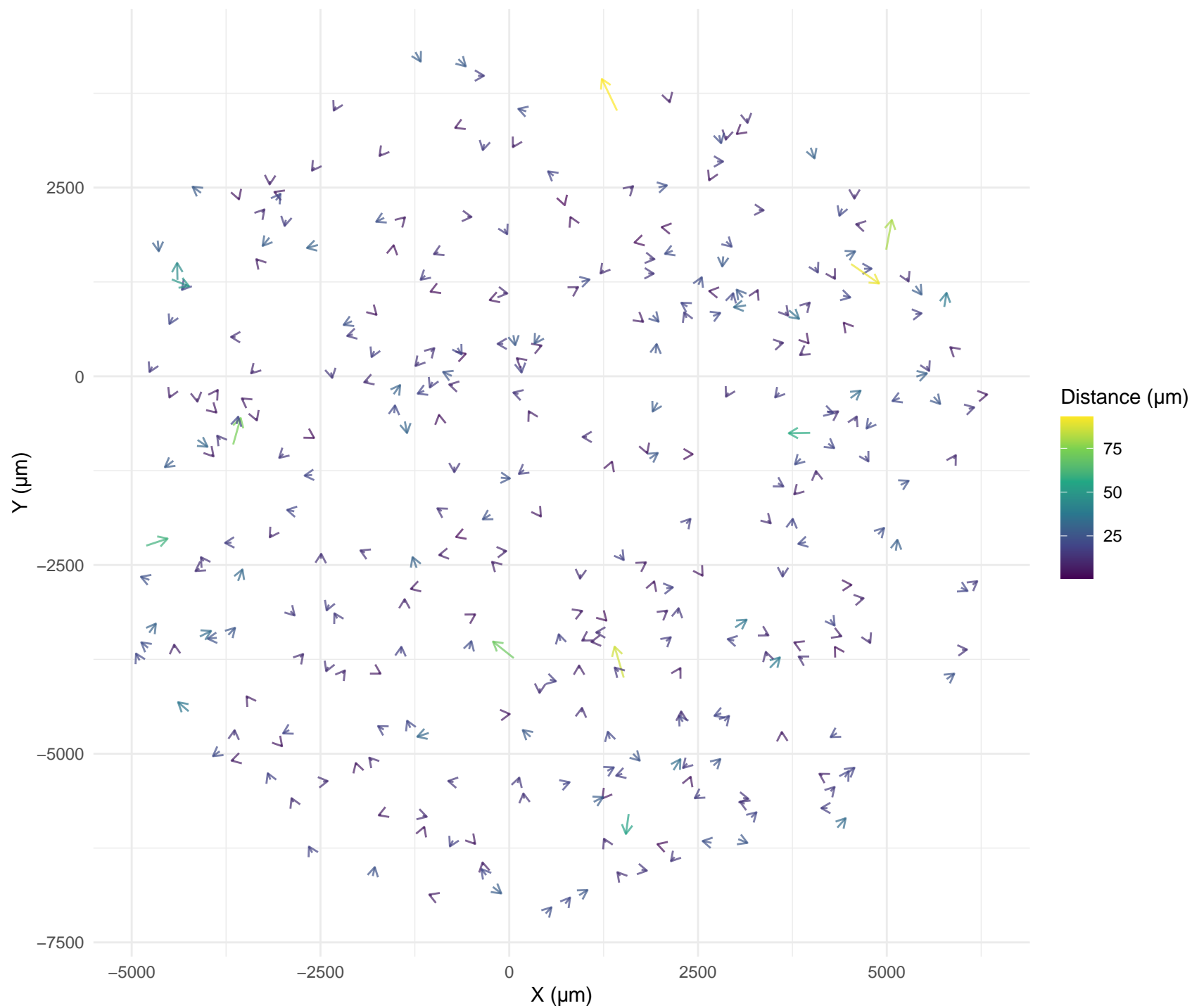
# Alignment Residuals

Offset from FTIR (transformed) to Raman (nearest match)



# Residual Vector Field

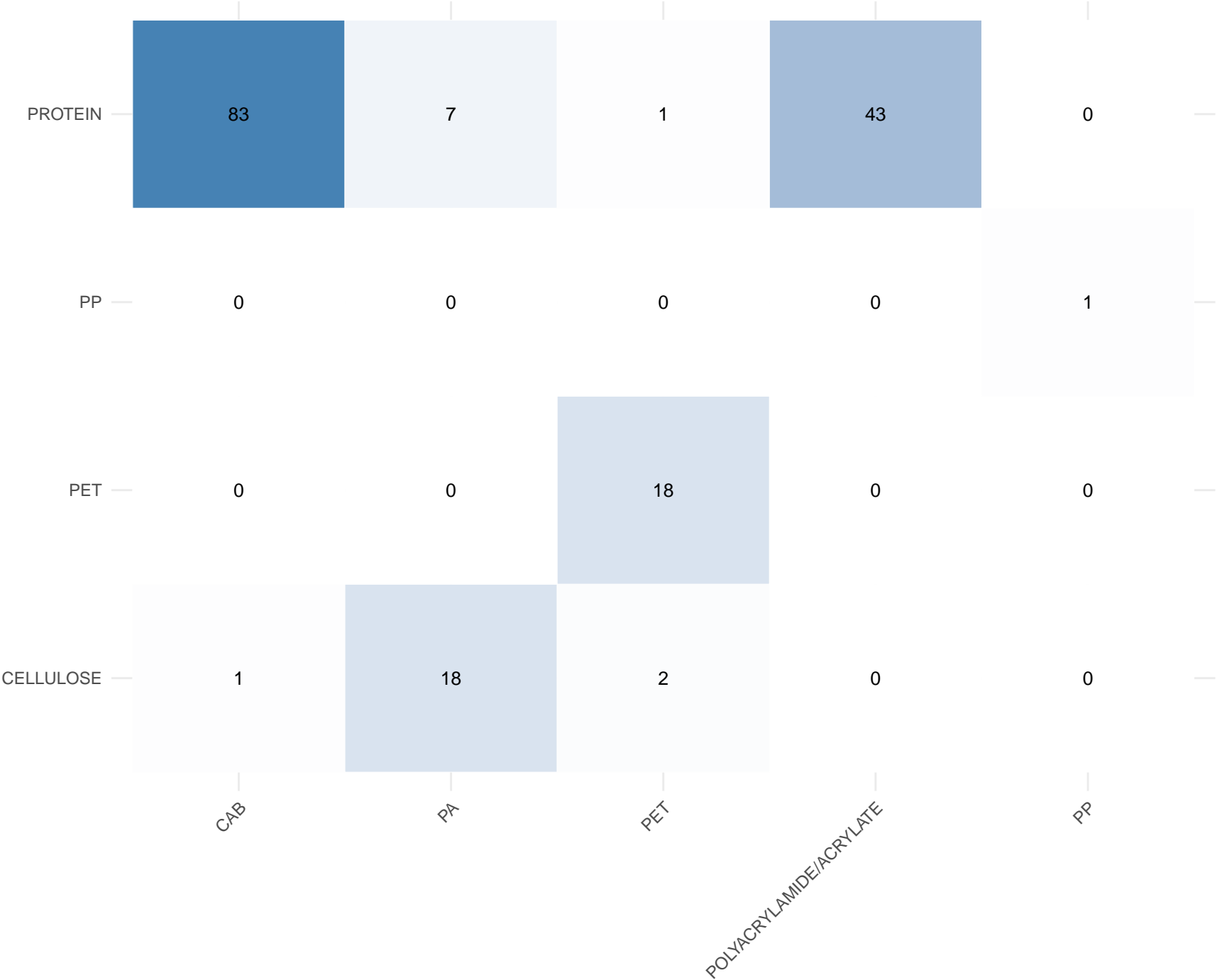
Arrows magnified 5x | Systematic patterns indicate local distortion



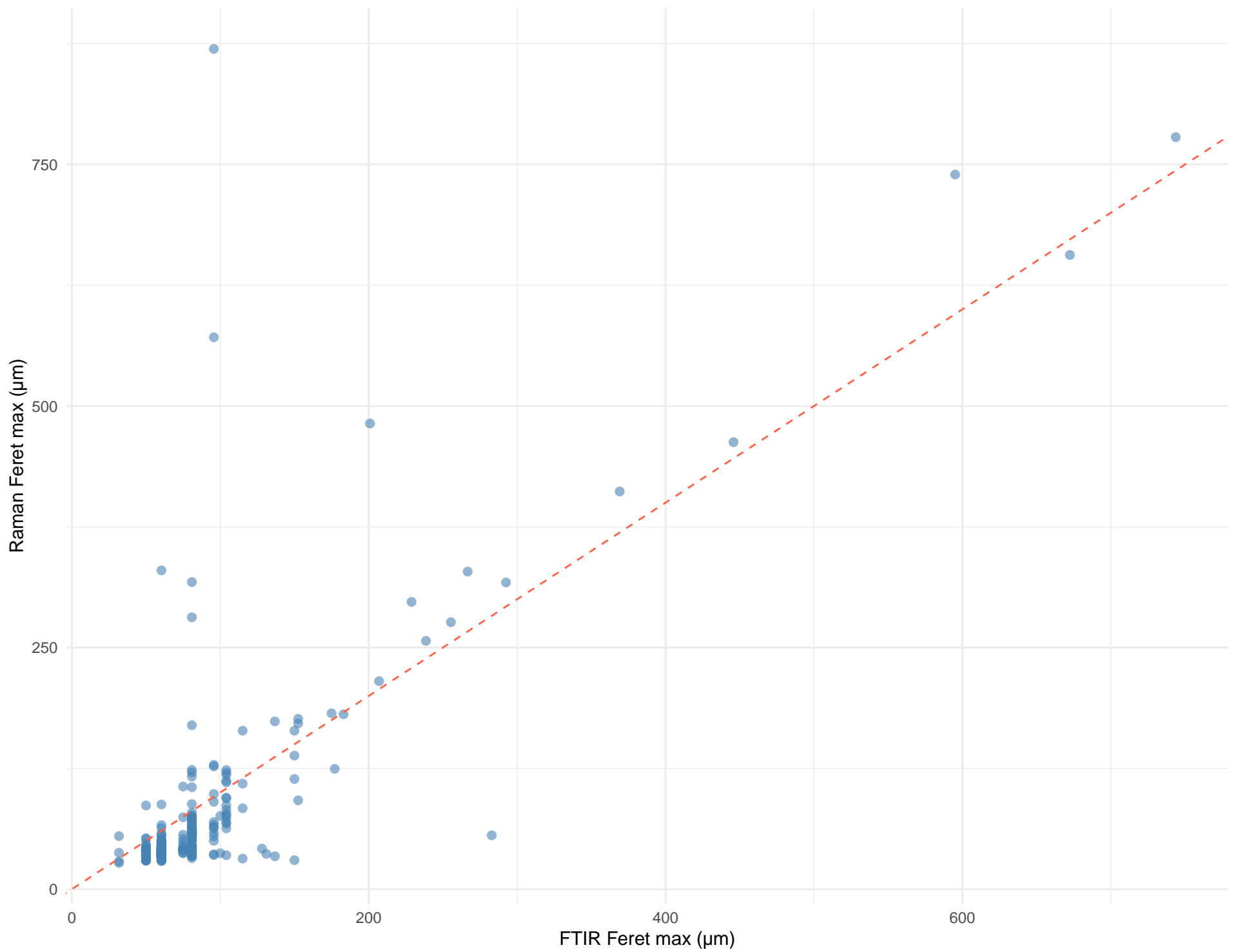
Material Confusion Matrix (FTIR vs Raman)

Exact: 0% | Family: 11.5% | Family+: 11.5%

FTIR material

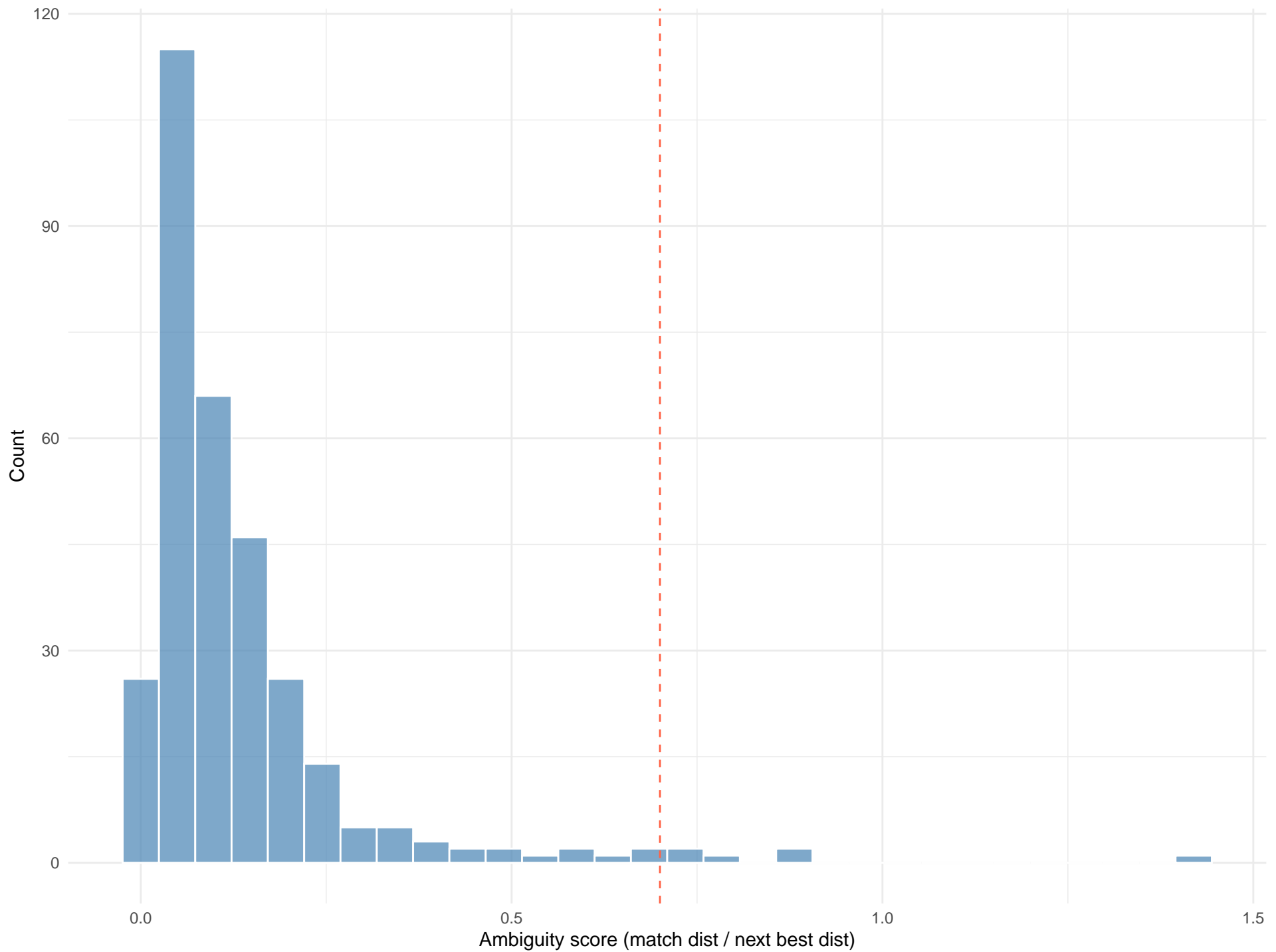


Particle Size Comparison (matched pairs)



# Match Ambiguity Score Distribution

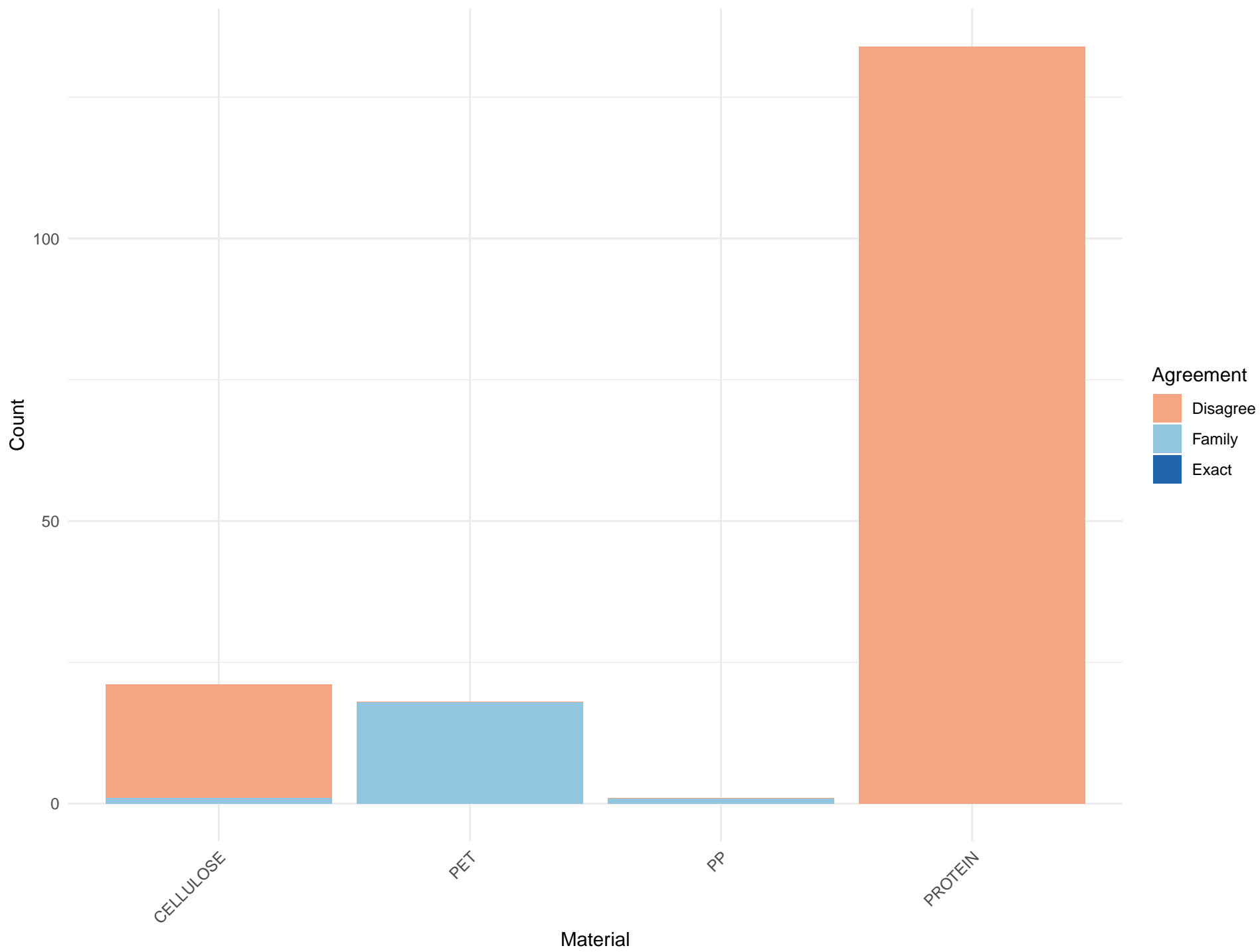
Flagged (>0.7): 7 of 322 pairs





# Tiered Agreement by Material

Overall: Exact 0%, Family+ 11.5%



# LDIR...Raman Particle Overlay (aligned coordinates)

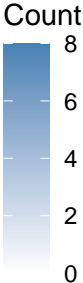
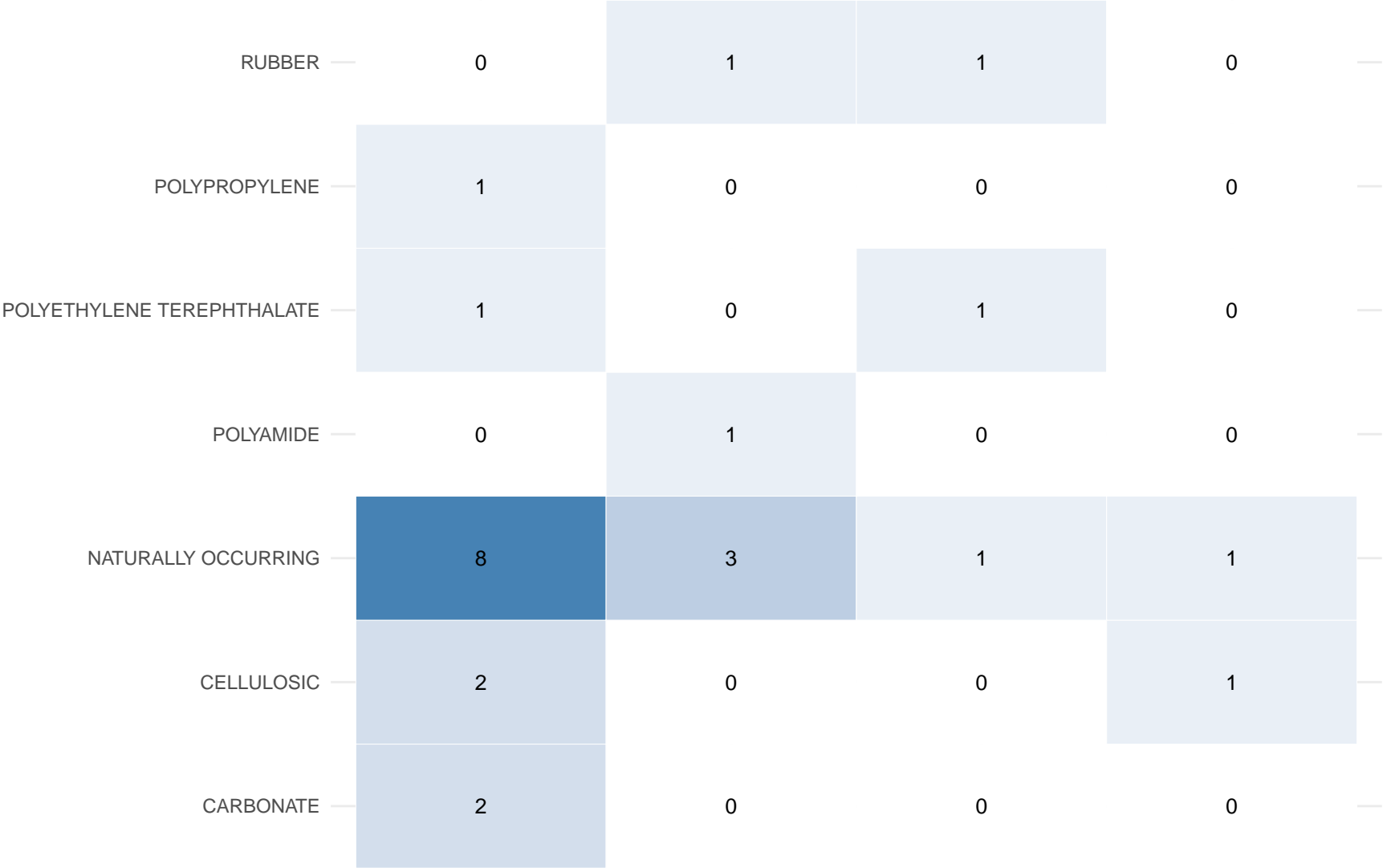
Green triangles = LDIR, Blue circles = Raman



Material Confusion Matrix (LDIR vs Raman)

Exact: 0% | Family: 16.7% | Family+: 16.7%

LDIR material



Raman material