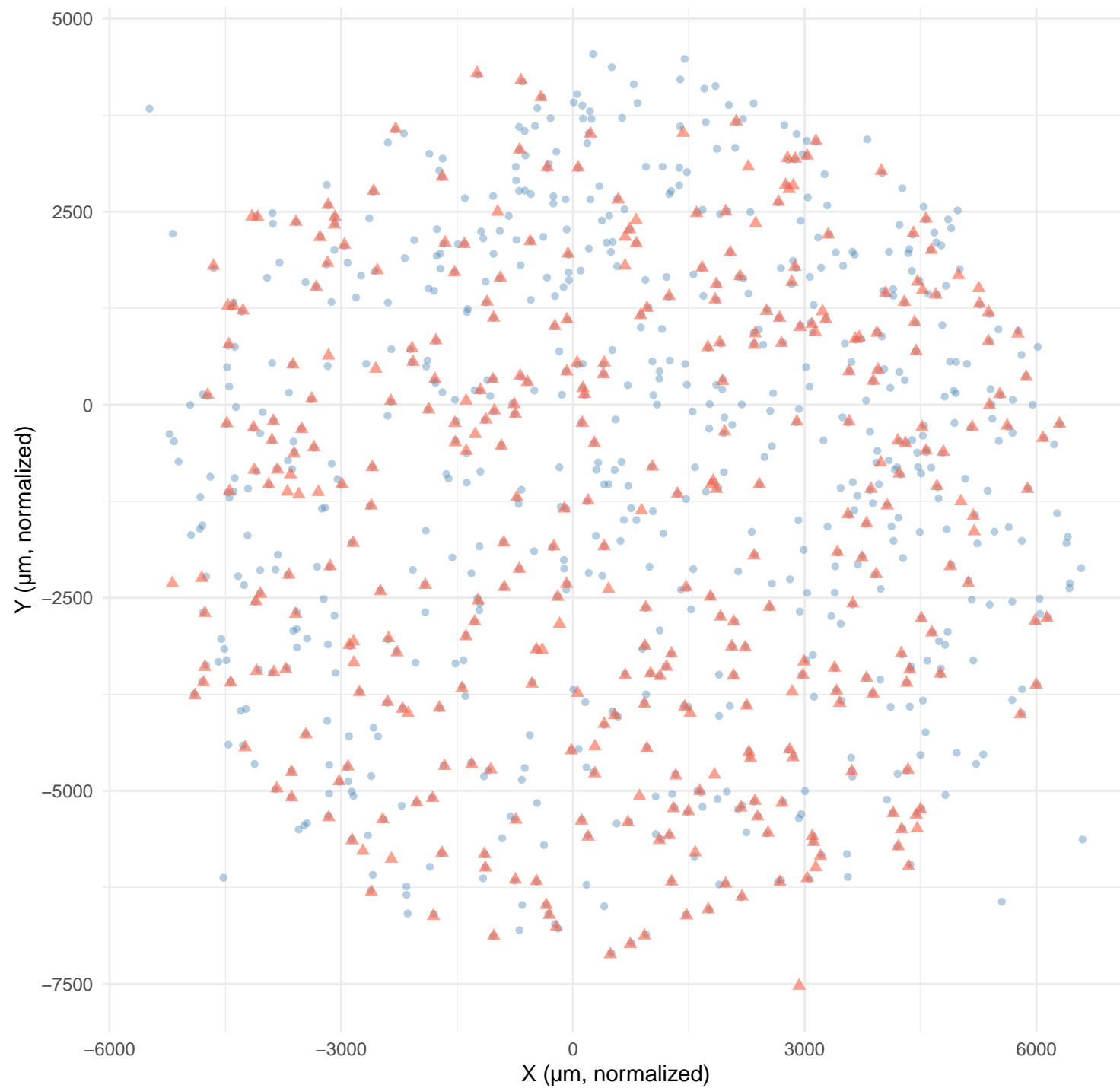


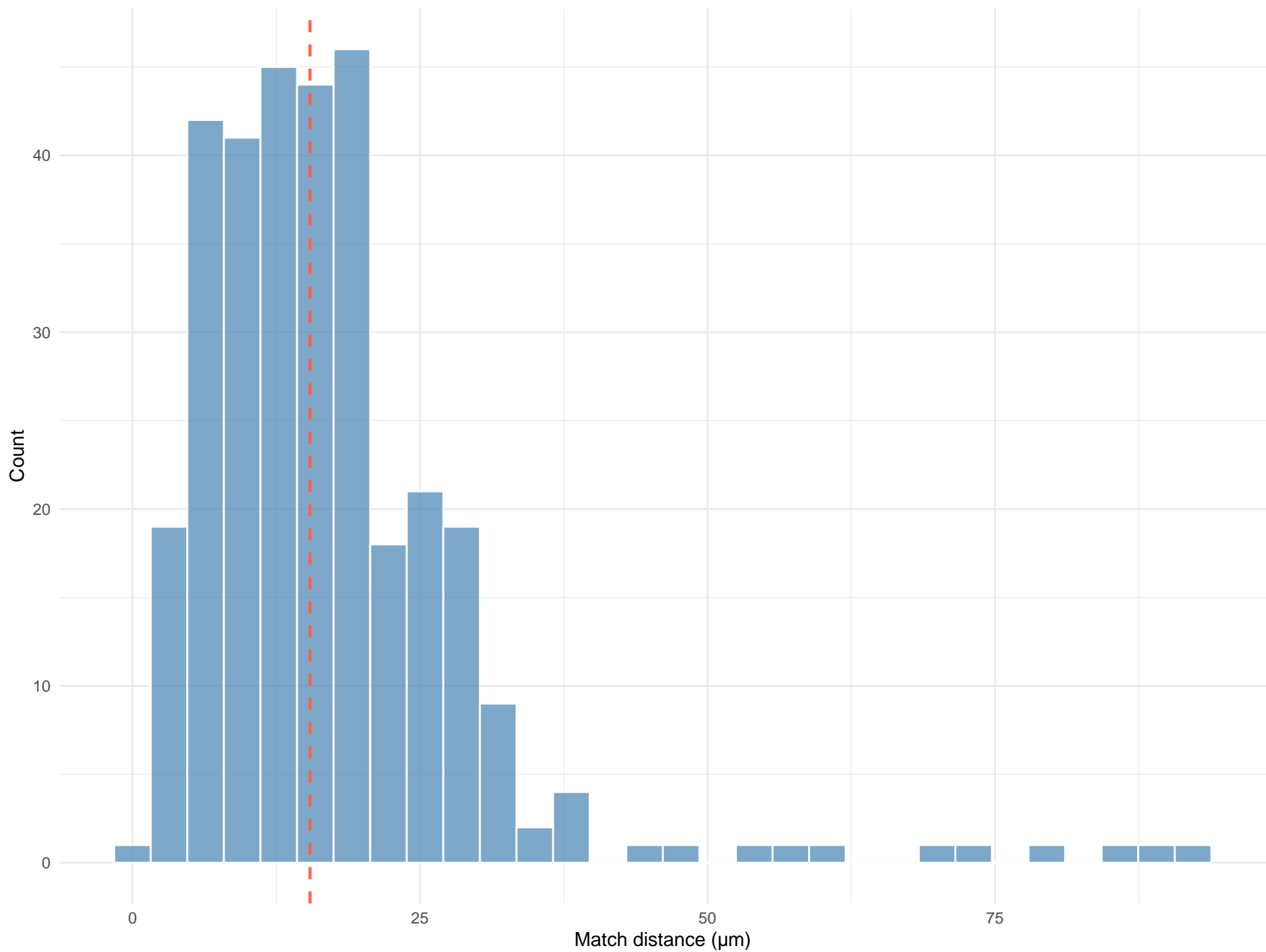
# FTIR...Raman Particle Overlay (aligned coordinates)

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



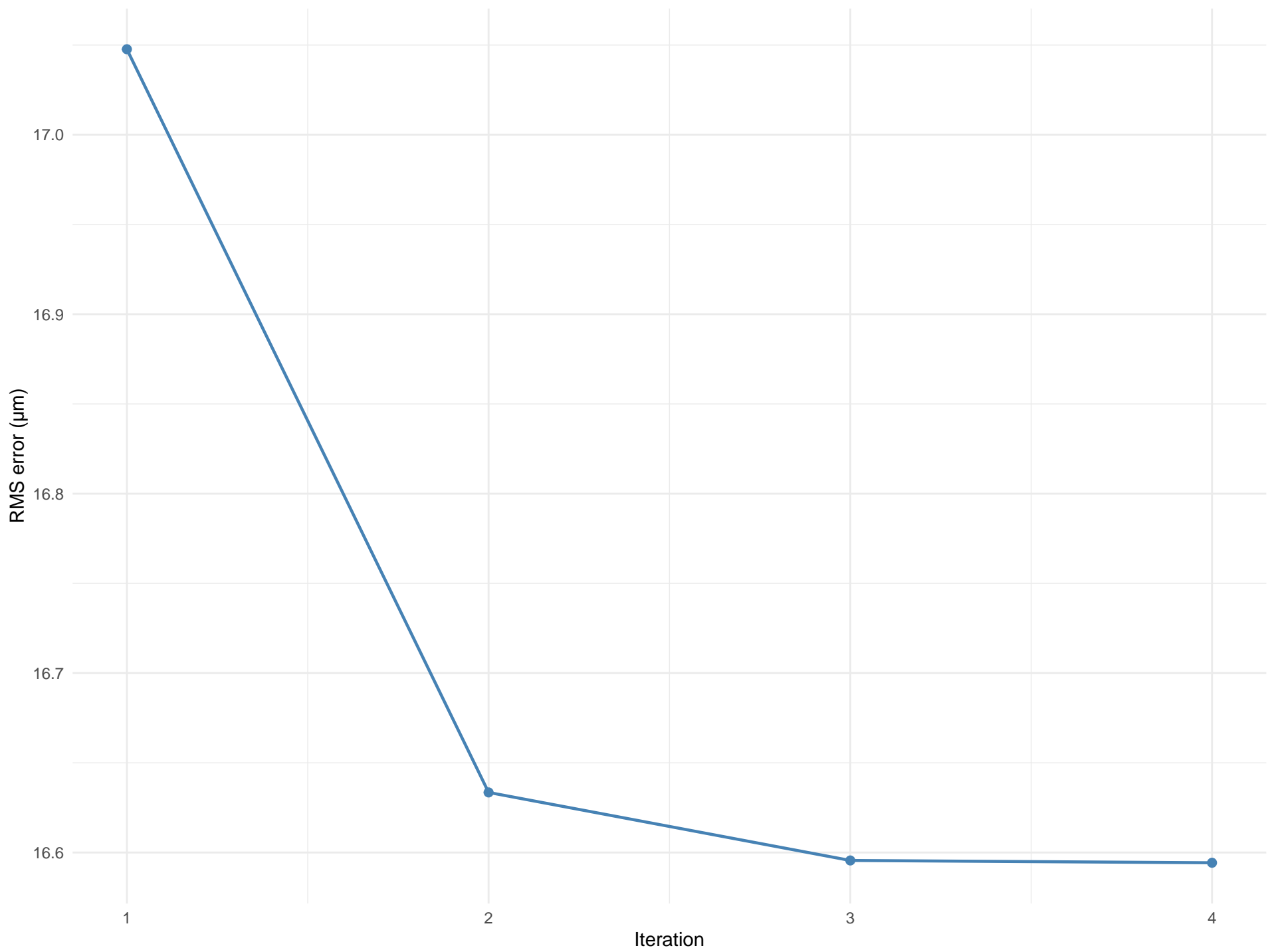
# Match Distance Distribution

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



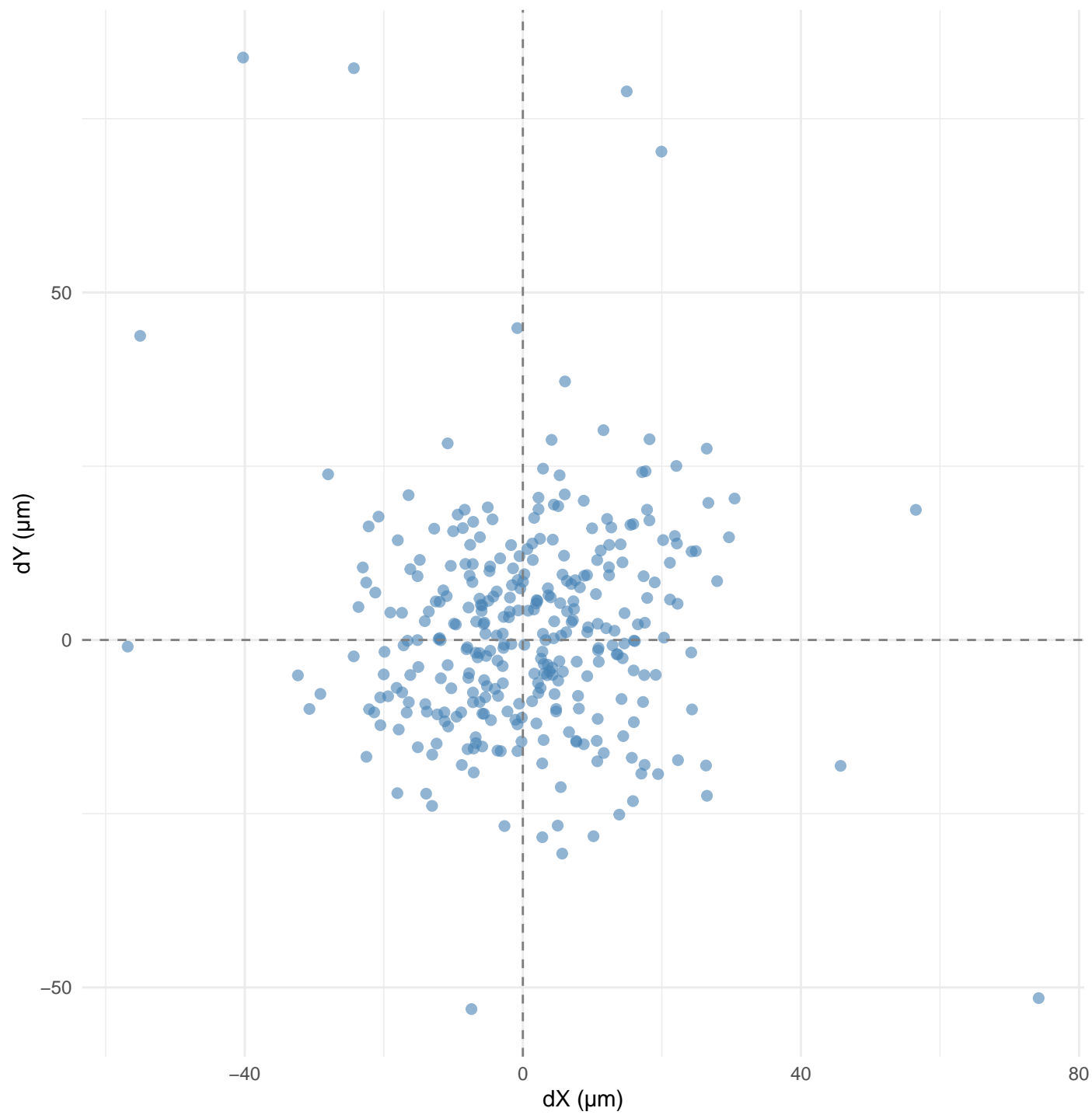
# ICP Convergence

Converged: TRUE, Iterations: 4



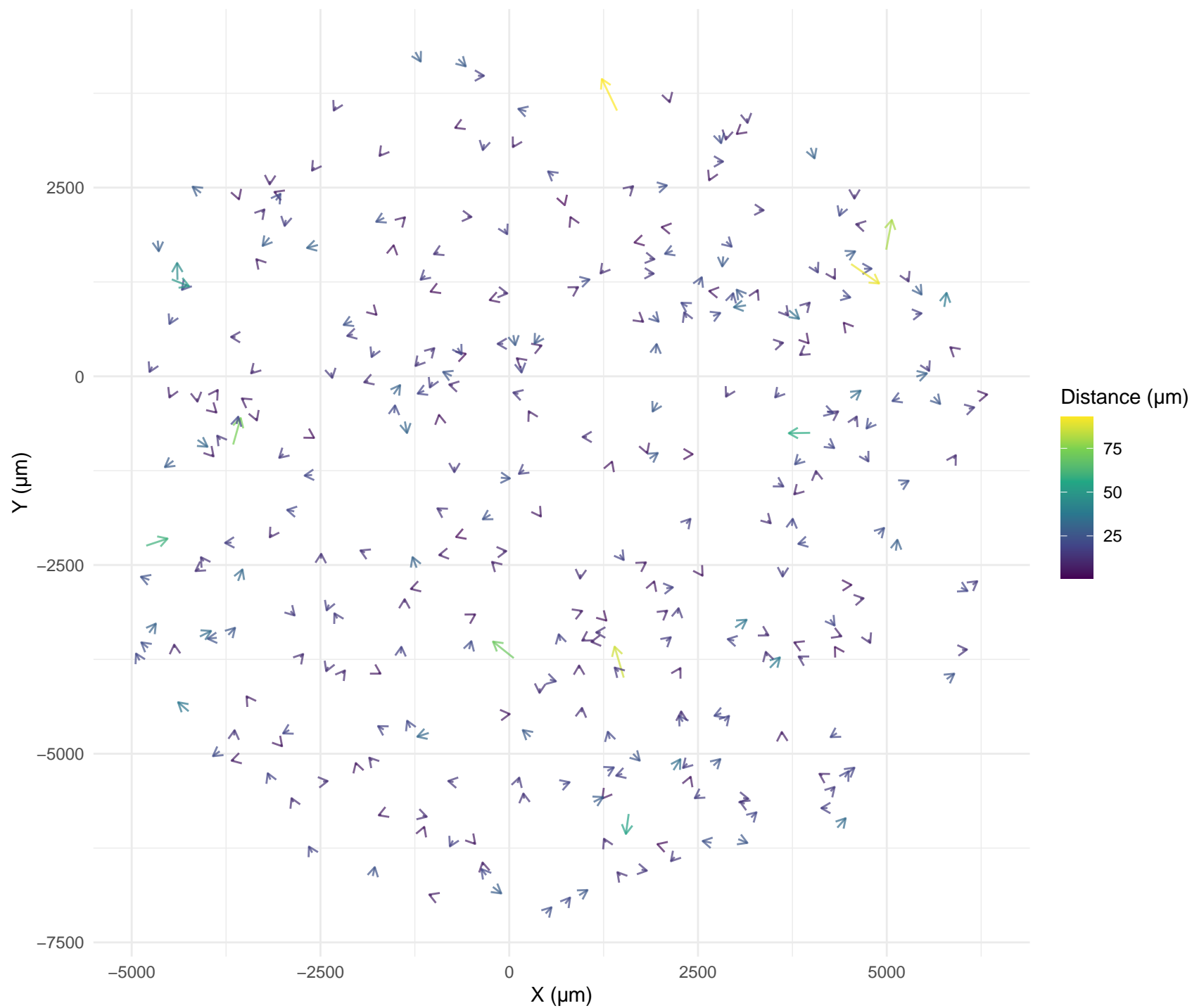
# Alignment Residuals

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



# Residual Vector Field

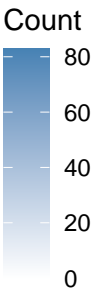
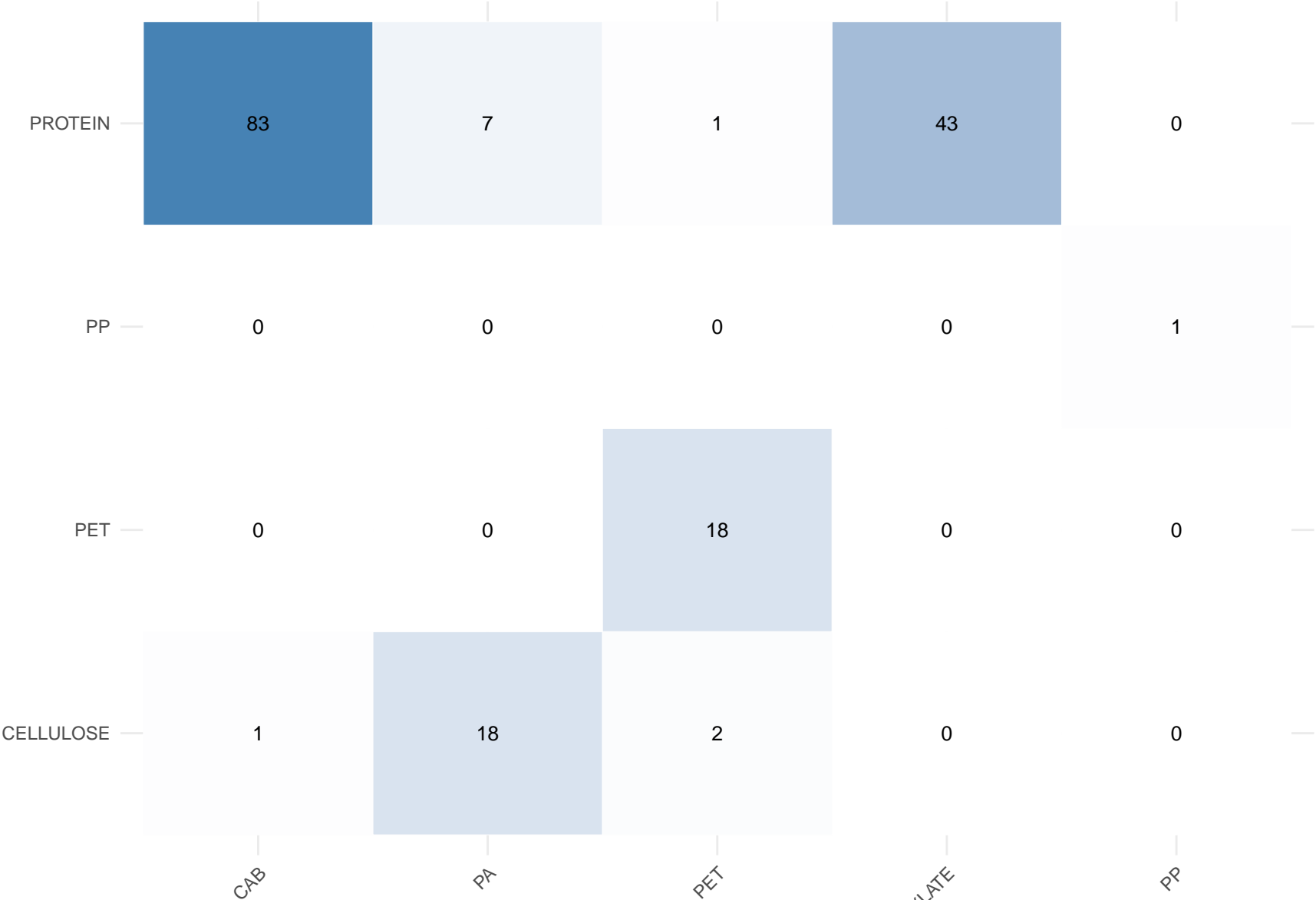
Arrows magnified 5x | Systematic patterns indicate local distortion



Material Confusion Matrix (FTIR vs Raman)

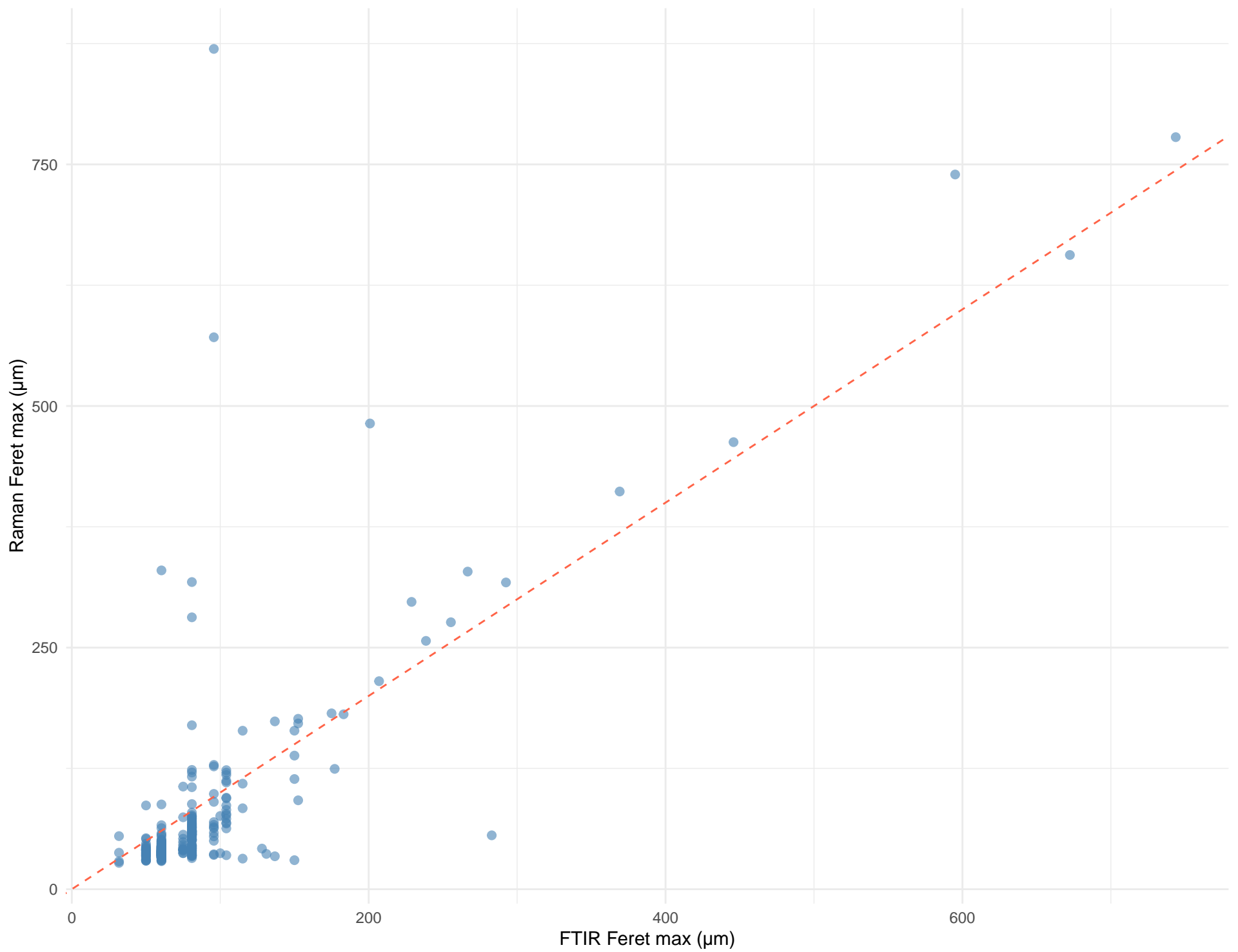
Exact: 0% | Family: 11.5% | Family+: 11.5%

FTIR material



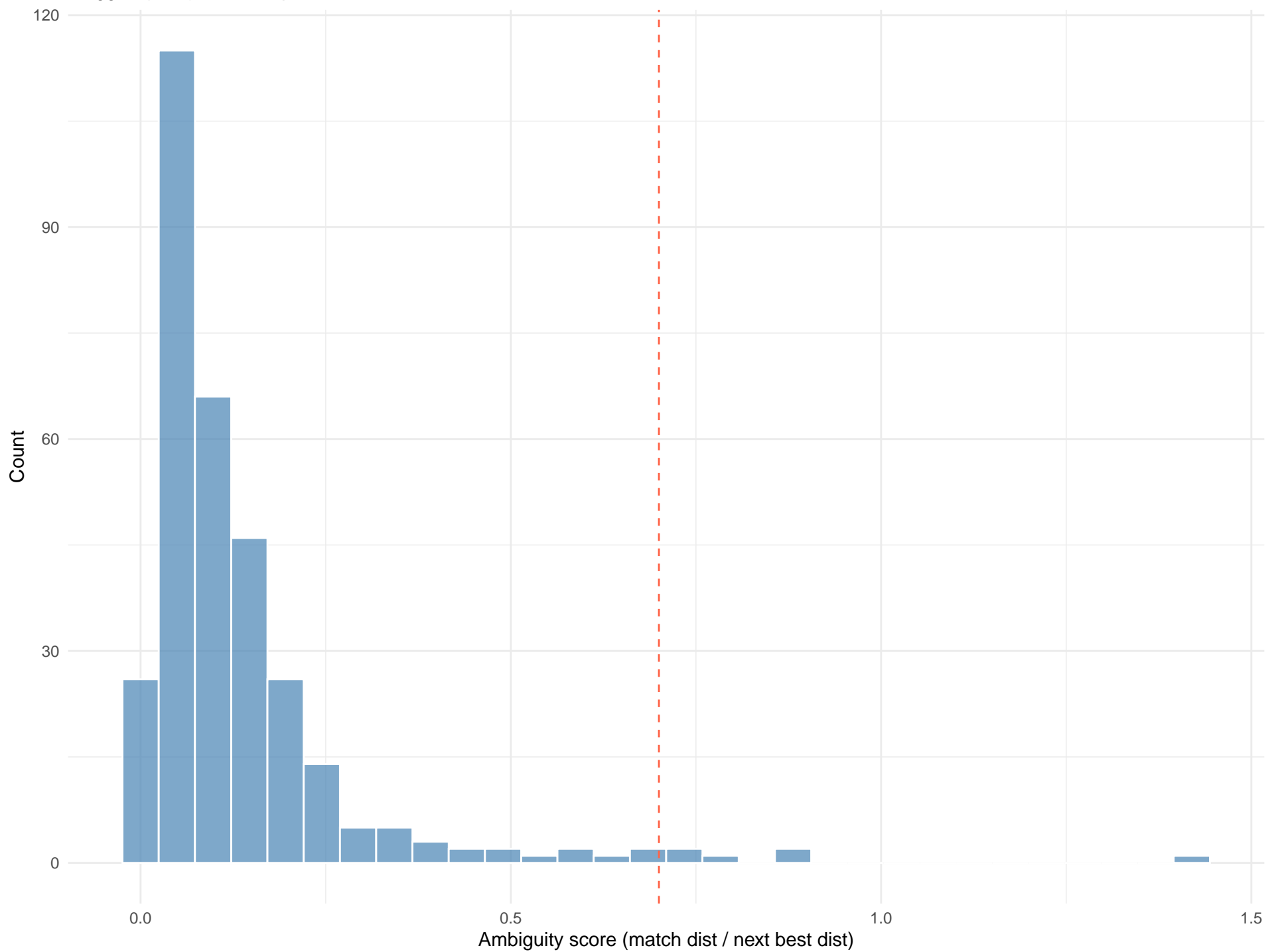
Raman material

Particle Size Comparison (matched pairs)



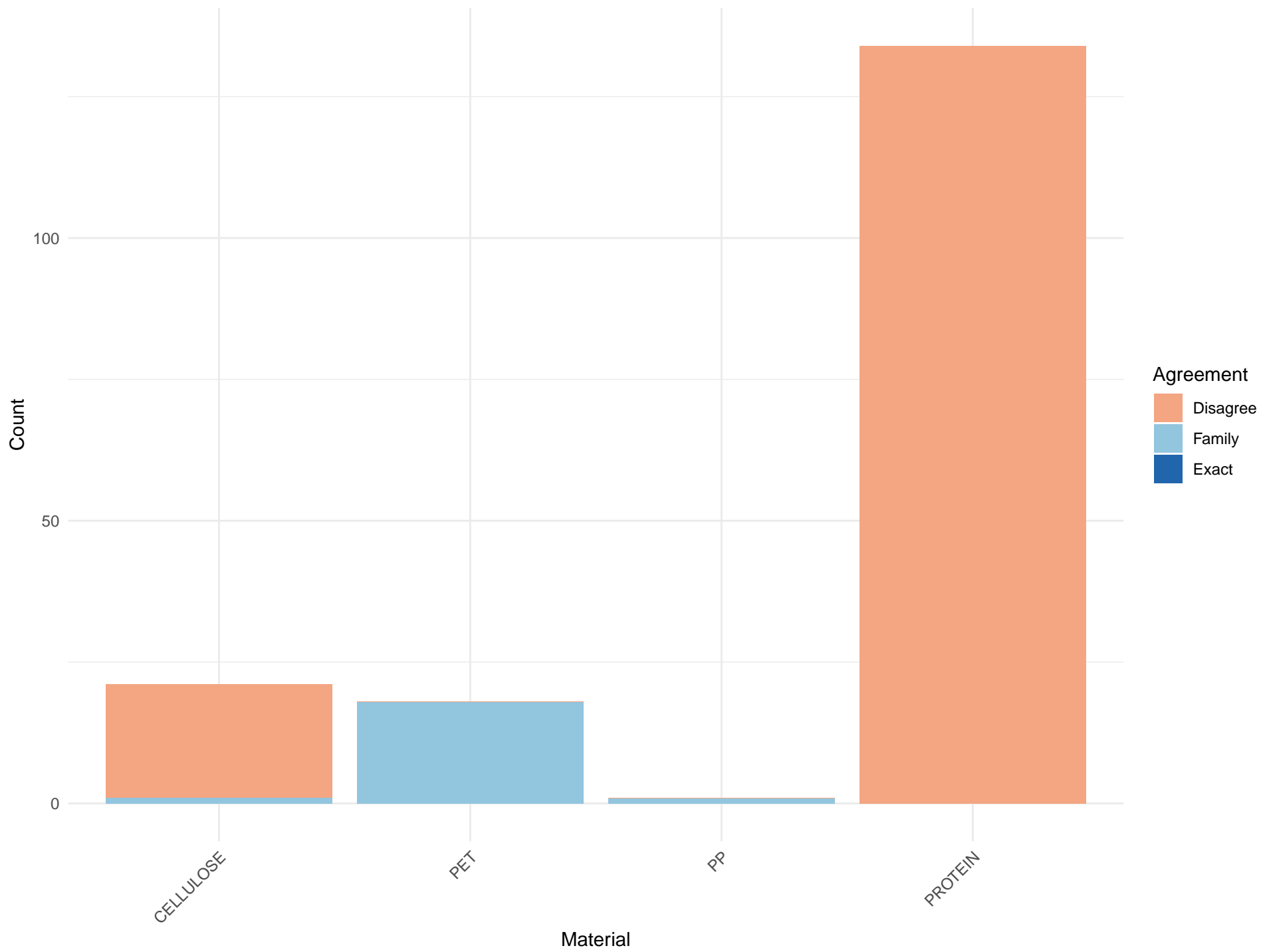
# Match Ambiguity Score Distribution

Flagged (>0.7): 7 of 322 pairs



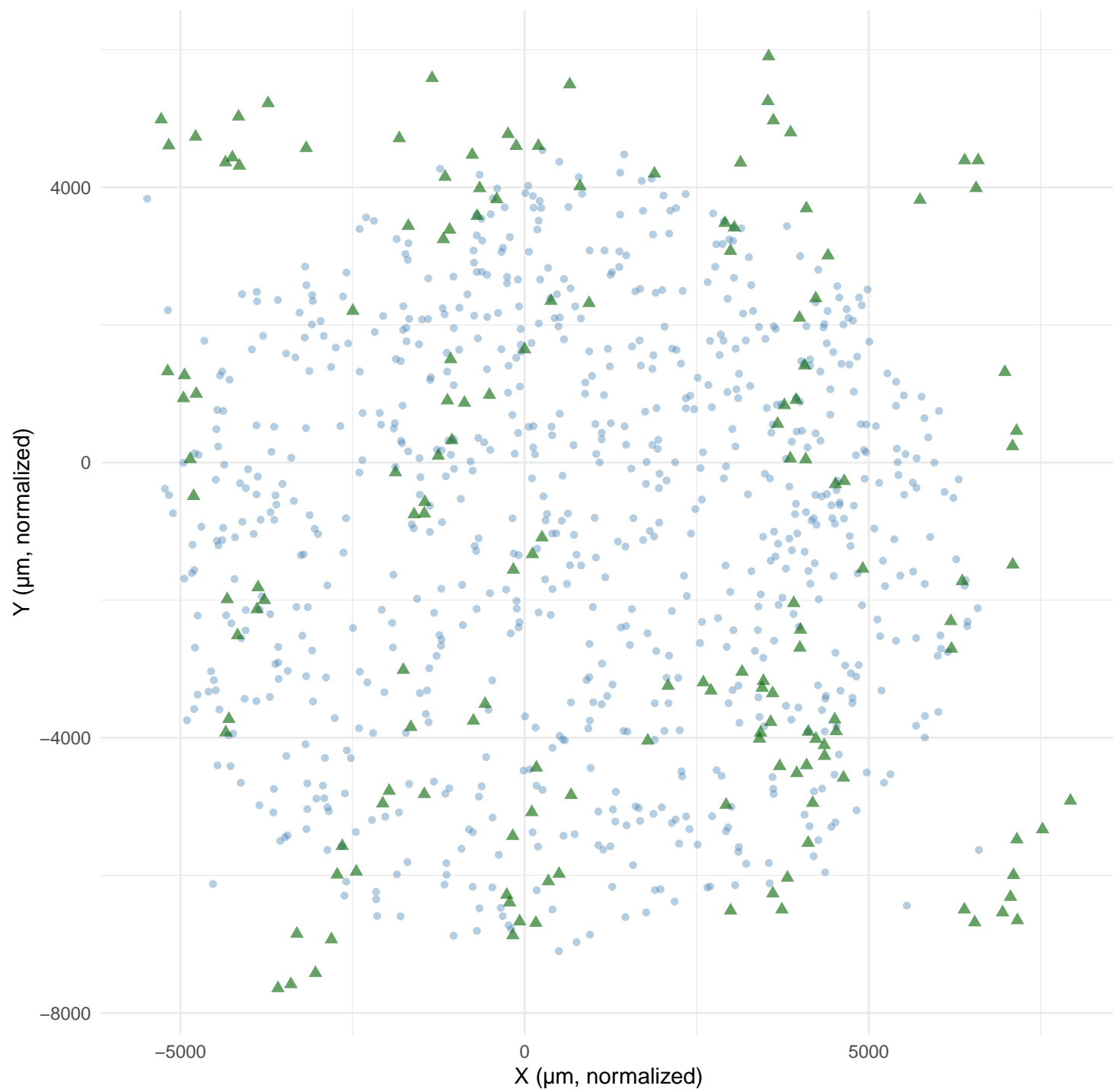
# Tiered Agreement by Material

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: 6.7% | Family+: 6.7%

LDIR material

