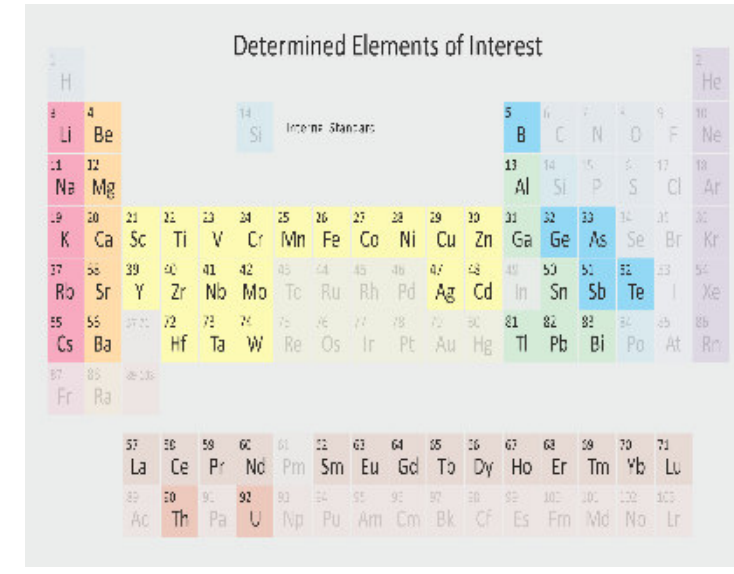


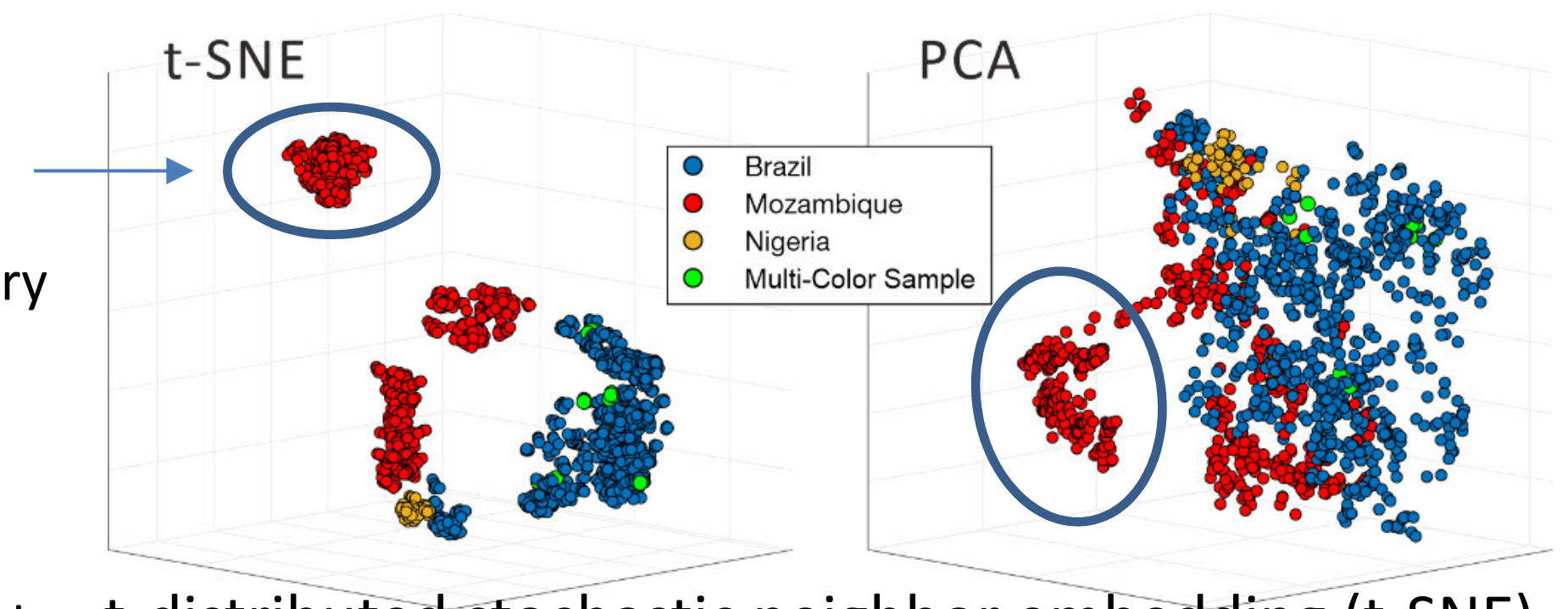
Multi-Element Correlation Analysis of Cu-bearing Tourmaline using LA-ICP-TOF-MS

Hao A.O. Wang, Michael S. Krzemnicki, Susanne Büche, Sarah Degen, Leander Franz, and Rainer Schultz-Guttler

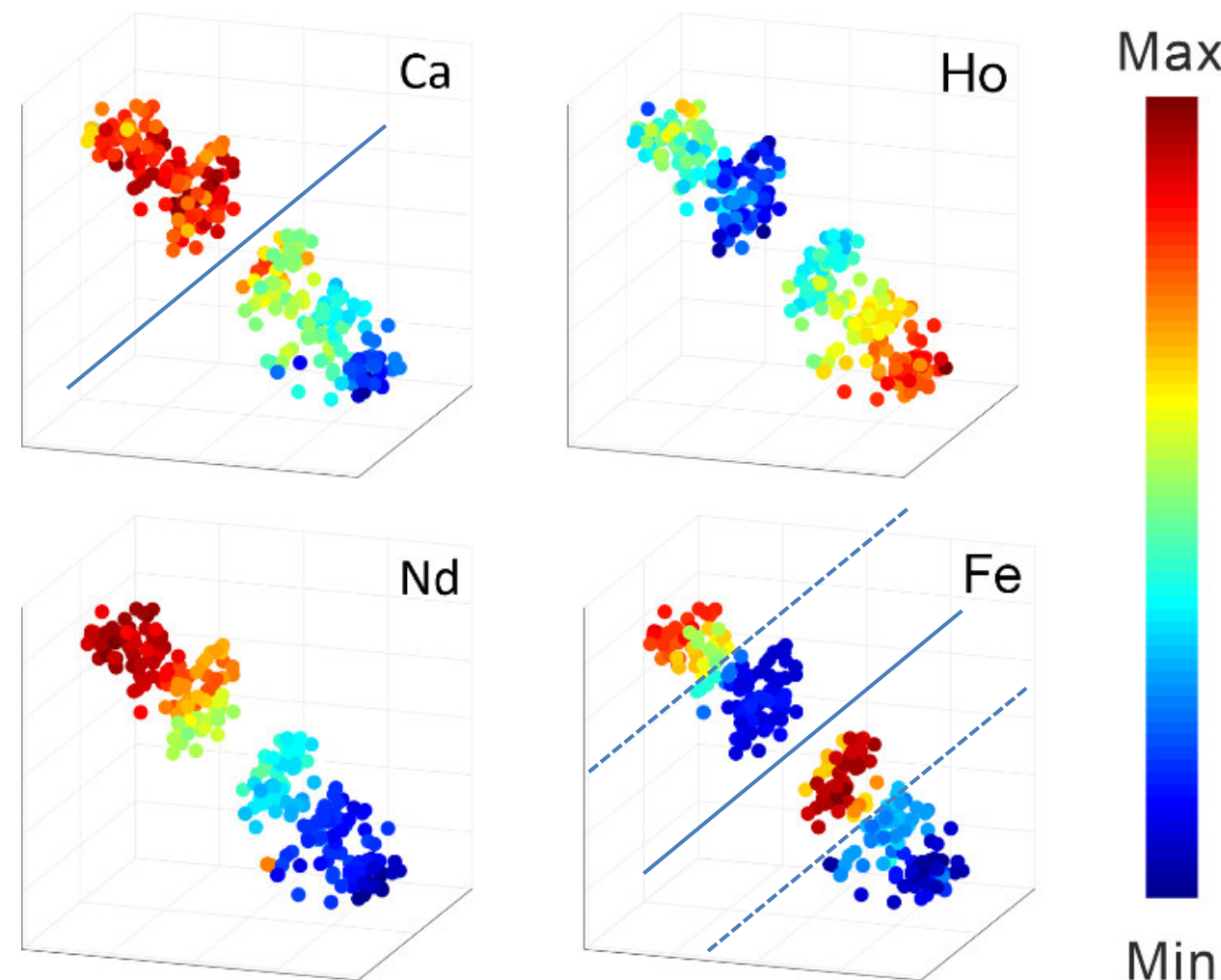


- + Cu-bearing tourmaline: unique and highly sought-after gemstone
- + LA-ICP-TOF-MS combined with machine learning algorithm (*Ref.)
- + **'First measure, then determine'** elements of interest
- + Elemental similarity and correlation of 56 elements

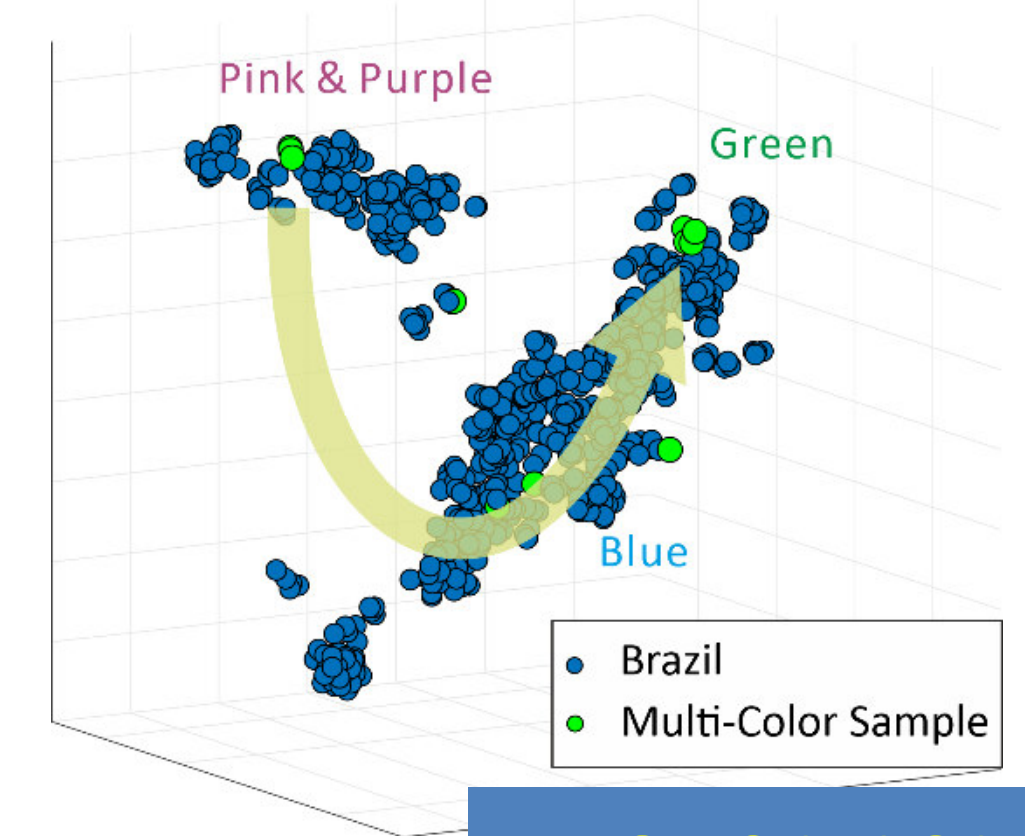
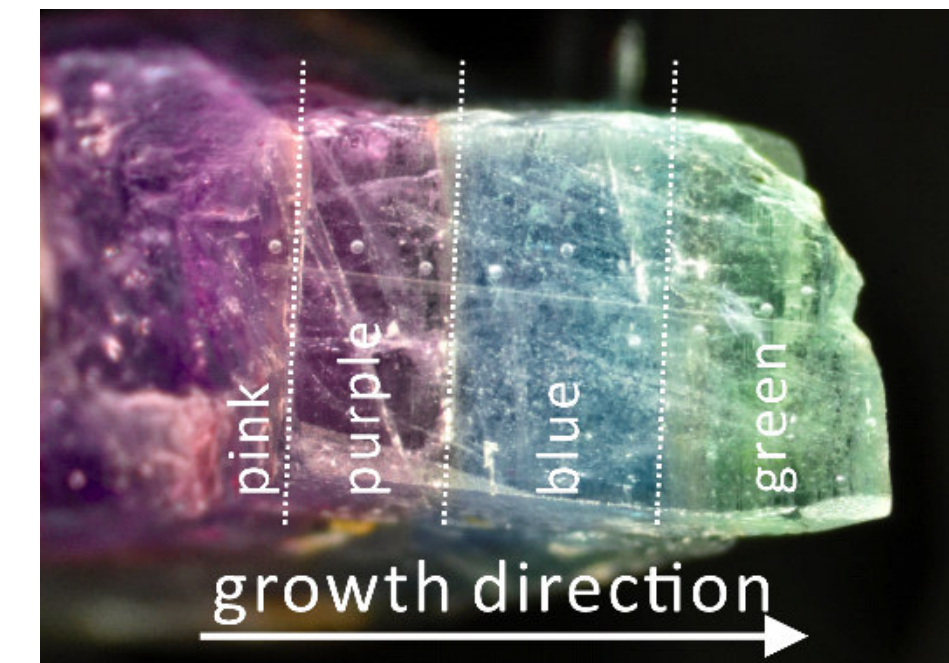
Ca-rich
Cu-bearing
liddicoatite
from secondary
deposit
near Maraca,
Mozambique



- + t-distributed stochastic neighbor embedding (t-SNE)
- + Non-linear and unsupervised
- + t-SNE is better than PCA in grouping samples based on elemental similarity



- + Two groups of Ca-rich Cu-bearing liddicoatite
- + Ca *correlates* with La-Nd
- + La-Nd *anti-correlate* with Sm-Ho
- + In Cu-bearing elbaite, REEs *correlate*
- + Four subgroups based on other elements, e.g. Fe



- + Group-wise elemental variation during formation from pink to green
- + Trend of Fe/Mg ratio may indicate varying formation conditions from blue to green