

RAMAN MICROSCOPE STUDY ON POTASSIUM CHROMATE CRYSTALS FORMED ON STAINLESS STEEL SURFACE

EXPERIMENTAL

Polished stainless steel piece was oxidized in oven (400 °C, one hour) in order to get thicker oxide layer on the steel. Small amount of KCl-crystals (1-5 mg) were placed on the oxidized surface. Piece was heated in an oven (450 °C, half an hour) and analyzed.

MEASUREMENT CONFIGURATION IN RAMAN MAPPING

Laser	532 nm edge (power 50%)
Grating	1800 l/mm (vis)
Detector	Renishaw Centrus 2945K9
Objective	x100
Scan Type	Static scan
Exposure time	1s
Accumulations	1
Focus mode	Regular
Spectral range	58.27 to 1838.08 (centre 1000) Raman shift/cm-1

RESULTS

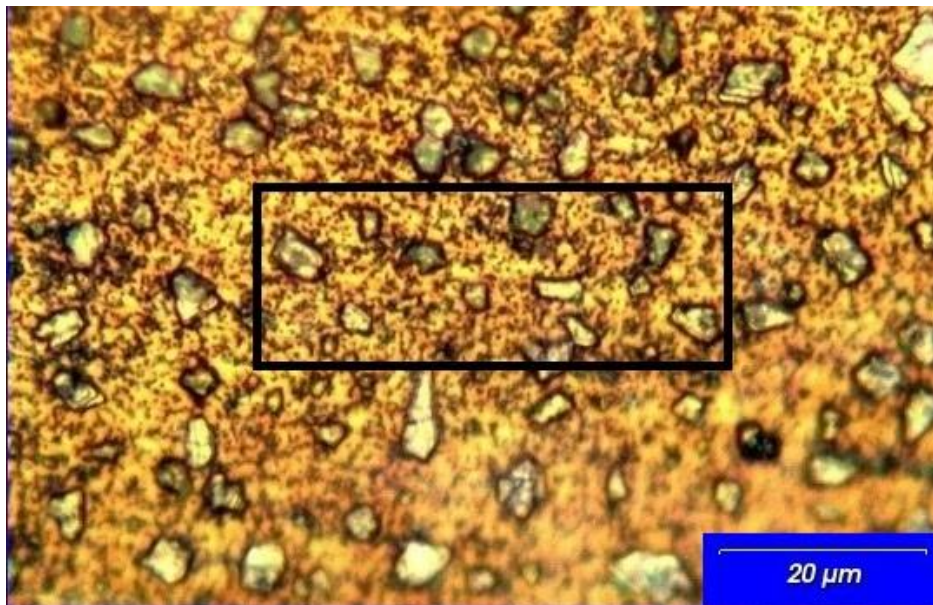


Figure 1. Image of the mapping area (rectangle).

RAMAN MICROSCOPE STUDY ON POTASSIUM CHROMATE CRYSTALS FORMED ON STAINLESS STEEL SURFACE

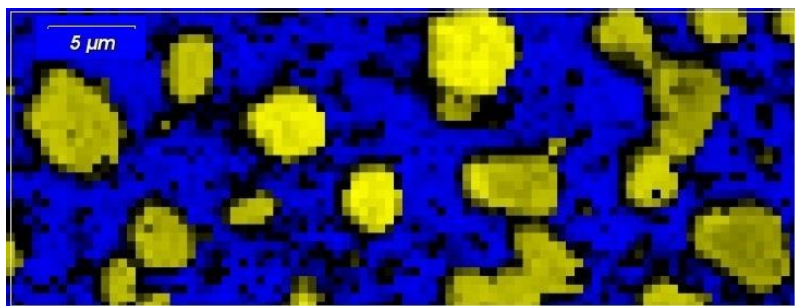


Figure 2. RAMAN maps on potassium chromate (yellow) and oxide (blue).

The different forms of corrosion products on steel surfaces were identified using Bio-Rad RAMAN libraries (Figure 3 and 4).

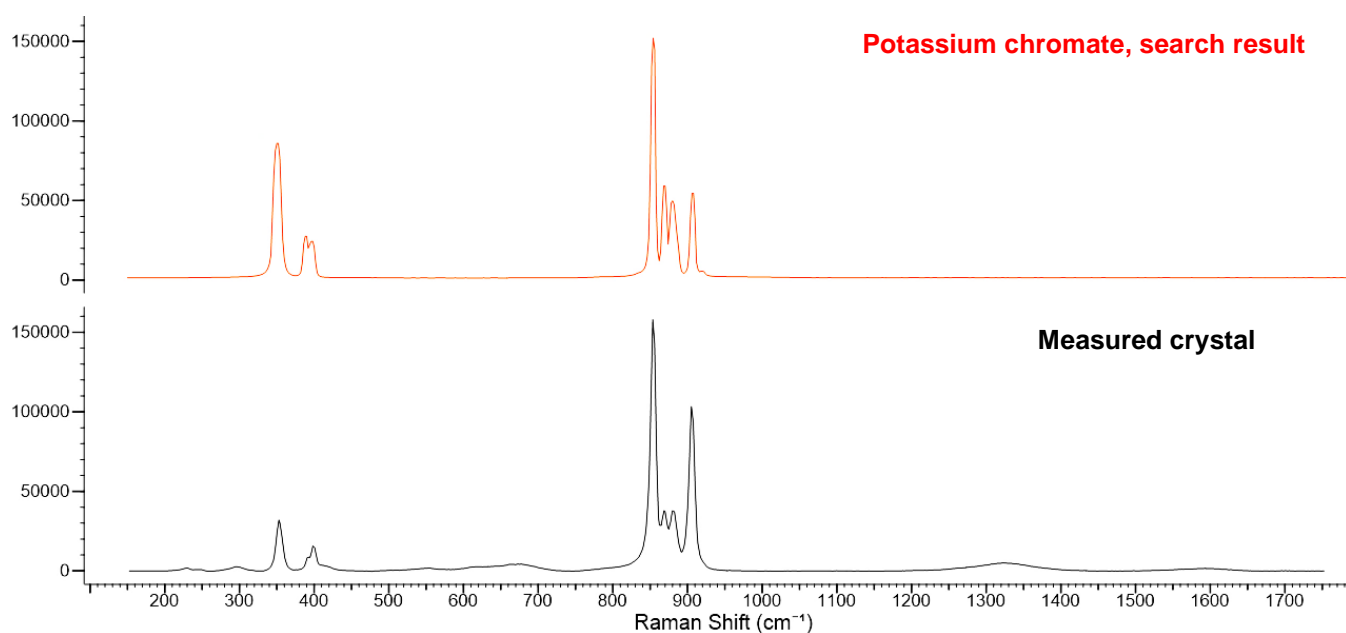


Figure 3. Spectra of the crystal and database search result.

RAMAN MICROSCOPE STUDY ON POTASSIUM CHROMATE CRYSTALS FORMED ON STAINLESS STEEL SURFACE

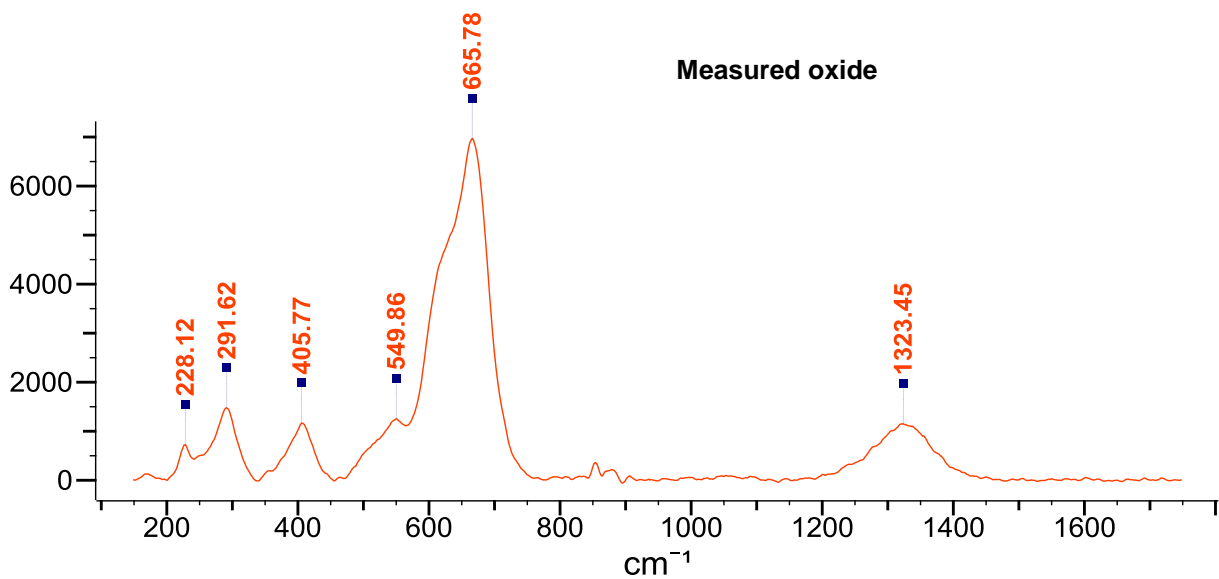


Figure 4. Spectrum of the oxide. Measured spectrum did not correlate well with any of the spectra in the RAMAN database. Analyst opinion is that spectrum is combination of different oxides (chromite, hematite...etc.).

SUMMARY

RAMAN-microscope is excellent tool for identifying and mapping different corrosion products formed on steel surface in microscopic scale. Technique is not yet widely used in corrosion studies, but analyst opinion is that it should be!