# Organics in Orogenic Gold Systems: Characterisation of organic matter associated with gold (Au) deposits

AILEEN ROBERT[1,2]*, HENDRIK GROTHEER[2], ROBERT LOCKHART[2], PAUL GREENWOOD[1], T. CAMPBELL MCCUAIG[1], CAROLINE M.B. JARAULA[2] KLITI GRICE[2], LEON BAGAS[1] AND LORENZ SCHWARK[2,3]

[1]Centre for Exploration Targeting, University of Western Australia, Perth, Australia
corresponding author: 21100691@student.uwa.edu.au
[2]WA-OIGC, Curtin University, GPO Box U1987, Perth WA 6845, Australia
[3]Institute of Geosciences, University of Kiel, Germany

Organic compounds can react with metal and sulfur species through a variety of processes including redox reactions and may influence physico-chemical properties important to mineralisation. The association of organic matter (OM) with metallogenic systems is well-observed and studied in low to moderate (<350 °C) temperature regimes. Thermally mature systems (>350 °C), common to most orogenic Au in Australia, challenge analytical methods traditionally used for OM analyses. Presently, the characterisation provided by various state-of-the-art techniques (e.g., catalytic Hydropyrolysis (HyPy), Gas Chromatography (GC) isotope ratio Mass Spectrometry (irMS), Scanning Electrom Microscopy (SEM) combined with Energy-dispersive X-ray spectroscopy (EDS)) was explored through application to OM from typically high temperature (>550 °C) orogenic Au deposits. Data obtained with the new methods show promising links between OM and mineralisation, despite the low organic carbon content and high relative thermal maturity of the samples.

HyPy released hydrocarbons (HCs) display a homologous series of $C_{15}$ to $C_{36}$ *n*-alkanes (*n*-$C_{18}$, $\delta^{13}C$ = -28.4 ‰) with a distinctive even carbon number preference. Other HCs detected in the HyPy fraction included polyaromatic HCs, mainly pyrene ($\delta^{13}C$ = -16.3 ‰) and its hydrogenated products. These HCs were not detected in the bitumen fractions which showed essentially no GC-MS products and are structurally distinct from the carbonaceous “graphite” like material in the matrix and infills to mineral grains detected in SEM-EDS. The -20 to -30 ‰ bulk $\delta^{13}C$ of OM reveal isotopically lighter carbon with increasing distance from the ore zone. Further experiments and analysis are currently conducted on samples from the mineralised and unmineralised zones and will be scrutinised for possible hydrothermal footprints in the petrogenic markers, as well as other clues on the role of OM in Au mineralisation.