

Molecular Underground Chemical Tracers for Monitoring Underground Fluid Flows

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The ability to track deep well fluid flow is a critical need for efficient geothermal/hydrocarbon energy recovery. A variety of traceable synthesized products were therefore developed with consideration for desired solubility and survivability in harsh reservoir environments. These products (“taggants”) also need to be readily detectable by analytical methods (e.g., ICP, FTIR, and resonance Raman spectroscopy). Our taggants were based on three general concepts: (i) rare-earth doped nanoparticles based on monocationic oxide matrices, (ii) bulk rare earth salts, and (iii) soluble coordination complexes. Details of the synthesis, characterization, retention of the taggant in under underground conditions, intercalation into proppants, and molecular modeling on select species to understand their underground behavior will be presented.

The Bruker X-ray diffractometer used for some crystal solutions was purchased via a National Science Foundation CRIF:MU award to the University of New Mexico (CHE04-43580). Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell

Chemistry Science Investigation: Sandia National Laboratories

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Your help is needed! Our chemistry dog has been missing for over a decade! Each year, Sandia National Laboratories invites 4th grade students from all over New Mexico to participate in a chemistry show that features a chemistry dog. The chemistry dog eventually disappears, is presumed dognapped, and four suspects are identified. The workshop attendees rotate through ten unique stations based on scientific principles that contain clues to identify the dognapping culprit. As critical career path decisions are being initiated for 4th grade students, this workshop’s goal is to encourage interaction with scientists and engineers at a professional laboratory. The workshop’s impact is evaluated via a survey given to participants prior to a safety visit, immediately after the workshop, and two months after the workshop. The survey results from two consecutive years and a general description of the program will be presented.

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