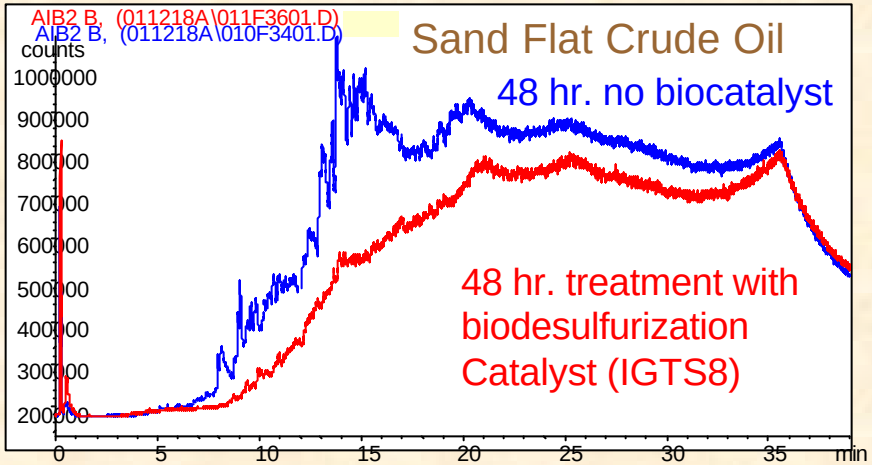
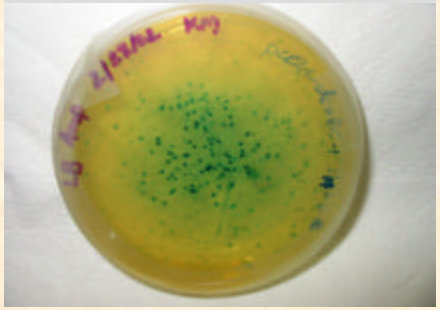
Developing improved biocatalysts for sulfur removal from petroleum feedstocks

Abhijeet Borole and Choo Y Hamilton,
Biochemical Engineering Research Group, Life Sciences Division

- **Performed biodesulfurization (BDS) treatment of Sand Flat crude oil for studying a synergistic biodesulfurization-biocracking process. Further improvements needed for sulfur removal under hump.**



Screening of dsz mutant clones

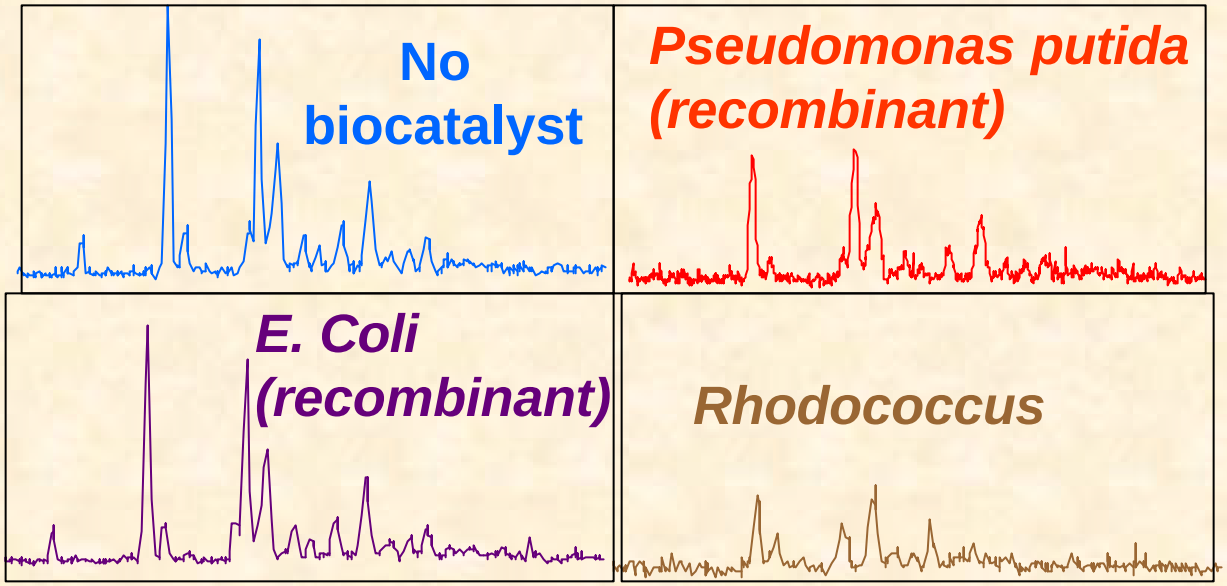


DNA analysis by Gel electrophoresis

- **Generated first round of desulfinase mutants. Activity and specificity studies now in progress**
- **Tested 5 aromatic sulfonates to identify recalcitrant organosulfur compounds for the desulfinase enzyme and the dsz enzyme system.**

Developing improved biocatalysts for sulfur removal from petroleum feedstocks

- **Sulfur removal from non-hydrotreated and severely hydrotreated diesel**
- **Microbial catalyst hosts used: *Rhodococcus* IGTS8, *Pseudomonas putida* and *E. coli***
- **Mass transfer of sulfur compounds into cells affects conversion – differs with host**
- **Host selection important criteria in biodesulfurization**



Developing improved biocatalysts for sulfur removal from petroleum feedstocks (details)

Abhijeet Borole and Choo Y Hamilton,
Biochemical Engineering Research Group, Life Sciences Division

- **Project collaborators:**

  ChevronTexaco, ExxonMobil, UTK
- **Sponsor: DOE OIT, Industries of the Future**
- **Project Focus:**
  - **Biodesulfurization enzyme specificity and activity improvement**
  - **Apply directed evolution techniques including point mutagenesis and gene shuffling**
  - **Synergistic biocracking-biodesulfurization process evaluation**
  - **Applications include diesel and crude oil desulfurization.**