Área: *FIS* **Nº de Inscrição: (a definir)**

Adsorption and stability study of self-assembled monolayers on calcite ($CaCO_3$).

Caroline Yuri Aoki (PG),[1] Paulo Barbeitas Miranda* (PQ),[1,2]

caroline.aoki@usp.br; miranda@ifsc.usp.br

[1]São Carlos School of Engeneering (EESC), University of São Paulo (USP), São Carlos-SP, Brazil; [2] São Carlos Physics Institute (IFSC, University of São Paulo (USP), São Carlos-SP, Brazil

Keywords: *Self-assembled monolayers, Oil recovery, Sum-Frequency Generation (SFG), Contact angle, Stearic acid, Calcite.*

Highlights

Saline solutions containing specific divalent metal ions increase oil removal from calcite surface.

Resumo/Abstract

One of the biggest challenges for the petroleum industry is improving the oil recovery from its reservoirs, which is difficult because it depends on several parameters involving the interaction among oil, rock and brine. Due to the great potential of Brazilian pre-salt reservoirs, oil recovery from such reservoirs rich in carbonatic rocks is a prominent scientific and technological problem.

Therefore, this study aims at investigating the molecular interactions among carbonatic rocks, oil and brine using a model system composed of calcite/stearic acid/brine. Since the oil acid fraction interacts strongly with carbonates, we have used stearic acid monolayers self-assembled from decane solutions, and we have probed their removal by rinsing with brines. The monolayer order at the molecular level were probed by a non-linear vibrational spectroscopy technique, Sum-Frequency Generation (SFG), and by contact angle (CA) measurements.

Sea water solutions with added divalent cations were used to investigate their efficiency for oil removal, and it was possible to conclude that rinses with some of them were capable of significant removal of stearic acid monolayers from the calcite surface, compared with rinses of pure sea water.

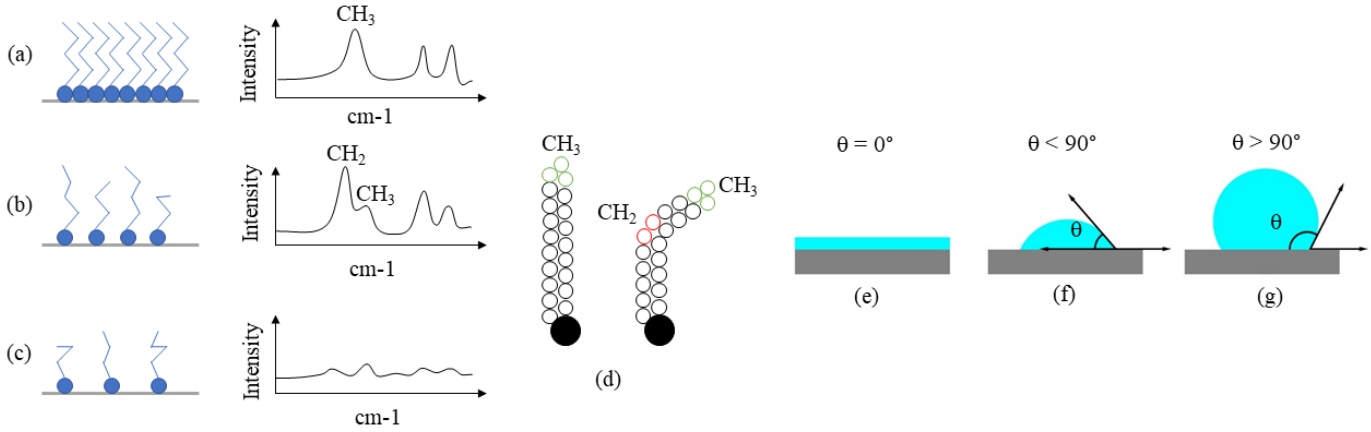

Figure 1: Representation of the impact of chain disorder on the SFG spectra in the CH stretch range: (a) fully ordered molecules, (b) partially disordered molecules, (c) disordered molecules. (d) Chain conformation of molecules with (right) and without (left) a *gauche* defect. Wetting behavior of a (e) completely wet, (f) slightly wet and (g) not wet surface, where θ is the contact angle.

Agradecimentos/Acknowledgments

We acknowledge financial support from Repsol Sinopec Brasil and FAPESP (2018/02819-0).