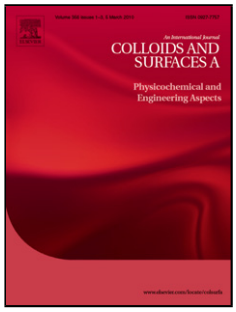

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Smart collectors：Control of the wettability and floatability of quartz with UV irradiation

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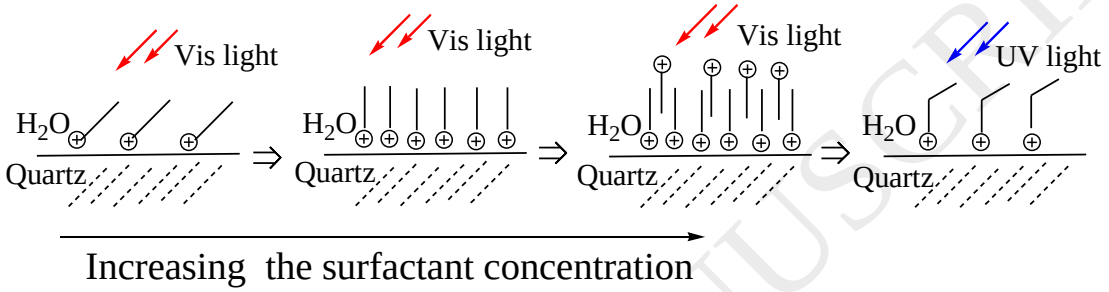
GRAPHICAL ABSTRACT



ABSTRCT:

Quartz is a hydrophilic mineral that usually associates with other ores. In this paper, the effect of UV stimuli on the wettability and floatability of quartz was studied. An azobenzene-containing surfactant was synthesized and its structure was identified by ^{1}H NMR. We used UV-Vis and ^{1}H NMR spectra of the surfactant to study its photoisomerization. After UV irradiation of the surfactant molecular, the trans isomer concentration decreases and the cis isomer concentration increases; both the aromatic protons of the azobenzene moiety and aliphatic protons experience an upfield shift, indicating that the surfactant molecular isomerizes from the trans isomer to the cis form. We used contact angle measurements to demonstrate that UV irradiation decreases the hydrophobicity of the quartz and increases the adhesion tension of the surfactant on quartz. The results of flotation tests demonstrate that the azobenzene-containing surfactant has higher performances than alkyl amine salt, and UV irradiation improves the selectivity of the azobenzene-containing surfactant in the flotation of quartz. This study demonstrates that the azobenzene-containing surfactant can be used as a light-responsive collector for quartz in the flotation of phosphate ores.

Keywords: Surfactant; Wettability; Flotability; Quartz; UV light irradiation; Azobenzene

1. Introduction

Smart materials are capable of responding to diverse external stimuli, such as light, temperature, pH, electrical stimuli [1]. Smart materials show great promise to alter surface properties of solids in a controlled manner. This is mostly based on