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Plasma-Modification of Mineral Surfaces for Optimizing Froth-Flotation FRANK MAY, VOLKER BRÜSER, ANTJE QUADE, CHRISTIAN WALTER, Leibniz-Institut fuer Plasmaforschung und Technologie (INP Greifswald e.V.) — Modifications of mineral surfaces result in changes in their wettability behavior. This is attracting a great deal of interest with regards to separation of mineral mixtures by froth flotation processes. In order to obtain the separation of minerals a number of chemicals, e.g. collectors, depressing reagents, etc., are conventionally used to increase either the hydrophilic or the hydrophobic properties. A new approach is to improve the selectivity of the bonding behaviour between these chemicals and surfaces by plasma pre-treatment of the mineral mixture. Thereby we try to increase the effectiveness of the flotation by reducing the amount of chemicals with a view to save expenses and enhance environmental friendliness. However, this requires the investigation of the physical interactions between mineral surfaces and plasmas. In our experiments we treated sulfidic minerals (FeS_2, $CuFeS_2$ and Cu_2S) with RF- and MW-plasmas in Ar-O_2- and Ar-H_2- mixtures under different conditions while the processes were observed by in situ mass spectroscopy. XRD-, XPS- and EDX-measurements were used for surface characterizations. We show that several minerals can be oxidised selectively caused by different reaction velocities. Additionally SO_4^{2-}-groups, an aging product which can interrupt the flotation, could be removed by Ar-H_2-Plasmas.

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