Development of a novel in-situ carbon content measurement for CIL and CIP processes

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ABSTRACT

The optimization of carbon management is essential for minimizing soluble gold losses in CIL and CIP circuits. Carbon inventory, i.e., knowing the carbon concentration in each reactor, is crucial for good carbon management. Currently, carbon concentrations are mainly determined from small samples that are taken manually from random locations. This kind of measurement is operator dependent, infrequent, and inaccurate. Outotec has developed and tested a novel continuous in-situ measurement for monitoring of carbon concentration that is based on the conductivity difference between ore and carbon particles.

Sample based measurement of carbon content is challenging due to non-homogeneous distribution of carbon in large industrial reactors. Accuracy of the measurement is thus determined by representativeness of the sample. In-situ CarbonSense measurement measures carbon content directly from the reactor utilizing several cubic meters of slurry volume to compensate the fluctuations in carbon distribution. Measurement is calibrated at the site with a transportable unit using authentic process samples. Linear correlation between measured voltage and carbon content is obtained over a wide range with accuracy of +/-1.0 g/L.

Three industrial trials have been conducted with the technology to gather information of long term exposure. Probe designs and placements have been developed between the trials. Good correlation to manual measurements have been obtained, but CarbonSense has been proven to be much more accurate. Carbon transfer cycles can be well identified from the measurement data. System is robust and requires very little maintenance during the operation. Reliable in-situ measurement enables automatization of the carbon control, which helps to minimize soluble gold losses.