

18th International Conference and Exhibition on
MATERIALS SCIENCE AND ENGINEERING
May 28-30, 2018 Osaka, Japan

Direct smelting of malachite ore with holding time variation by electric arc furnace method

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Copper is one of the first metals which had been used since the Neolithic age. Malachite, azurite and chrysocolla are included in the mineral categories which contain copper as hydroxi-carbonate compounds. With the direct smelting technology using electric arc furnace method, high-to-middle grade of malachite ore can be smelted and performed a reduction reaction directly which produce copper with few impurities. This research is conducted by direct smelting of malachite ore with 15.66% Cu. According to the test results and data analysis regarding the obtained research, the highest Cu grade and recovery (87.09% Cu and 94.95% recovery) is on 7 minutes of holding time, while the lowest Cu grade and recovery (29.97% Cu and 2.3% recovery) is on 2 minutes of holding time. The phases of the metal product according to XRD analysis with holding time variations are Cu and Fe. There is an occurrence of dissolved Cu in the slag with the highest percentage (3.99%) on 2 minutes of holding time and the lowest one (0.41%) on 5 minutes of holding time. The identified phases which occur in slags are pyroxene, fayalite, silicon carbide, chalcocite and magnetite.

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