

Abstract:

In this study, biomass cokes from sunflower seed hull (SFSH) and wood pellets (WP) were added to a MgO-C batch (3 mass % C) to replace 1.1 mass % of graphite. After hardening and carbonizing the samples, the influence of the biomass cokes on the microstructure and thermal shock resistance was investigated. The replacement of flaky graphite by carbonized WP and SFSH reduced the bulk density and increased the apparent porosity after pressing and carbonization, but the degree was only marginal. This was confirmed by SEM investigations, where the biomass-coke containing samples exhibited a microstructure with a higher amount of pores between the fine MgO grains. The thermal shock resistance of the porous wood pellet coke containing MgO-C is at the same level as the reference sample but not superior to it.

Keywords:

MgO-C; carbon; biomass; microstructure; thermal shock

Experiments:

- Processing - PaGe_002_Mixing_MgO-C_GraphiteNFL
- Processing - PaGe_003_Mixing_MgO-C_WoodPellets
- Processing - PaGe_004_Mixing_MgO-C_SunflowerSeedHullPellets
- Processing - PaGe_005_Pressing_MgO-C_BiomassPellets-120MPa
- Processing - PaGe_006_ThermalTreatment_MgO-C_BiomassPellets-1000degC
- Testing & Analysis - PaGe_007_HydroWeigh-Archimedes_MgO-C_GraphiteNFL-pressed
- Testing & Analysis - PaGe_008_HydroWeigh-Archimedes_MgO-C_WoodPellets-pressed
- Testing & Analysis - PaGe_009_HydroWeigh-Archimedes_MgO-C_SunflowerSeedHullPellets-pressed
- Testing & Analysis - PaGe_010_HydroWeigh-Archimedes_MgO-C_GraphiteNFL-1000degC
- Testing & Analysis - PaGe_011_HydroWeigh-Archimedes_MgO-C_WoodPellets-1000degC
- Testing & Analysis - PaGe_012_HydroWeigh-Archimedes_MgO-C_SunflowerSeedHullPellets-1000degC
- Testing & Analysis - PaGe_013_UltrasonicRuntime_MgO-C_GraphiteNFL-pressed
- Testing & Analysis - PaGe_014_UltrasonicRuntime_MgO-C_WoodPellets-pressed
- Testing & Analysis - PaGe_015_UltrasonicRuntime_MgO-C_SunflowerSeedHullPellets-pressed
- Testing & Analysis - PaGe_016_UltrasonicRuntime_MgO-C_GraphiteNFL-1000degC
- Testing & Analysis - PaGe_017_UltrasonicRuntime_MgO-C_WoodPellets-1000degC
- Testing & Analysis - PaGe_018_UltrasonicRuntime_MgO-C_SunflowerSeedHullPellets-1000degC
- Testing & Analysis - PaGe_021_ThermalShock_MgO-C_BiomassPellets-950degC
- Testing & Analysis - PaGe_022_3PB_MgO-C_GraphiteNFL-1000degC
- Testing & Analysis - PaGe_023_3PB_MgO-C_WoodPellets-1000degC
- Testing & Analysis - PaGe_024_3PB_MgO-C_SunflowerSeedHullPellets-1000degC

- [Testing & Analysis - PaGe_025_3PB_MgO-C_GraphiteNFL-1000degC-TS950degC](#)
- [Testing & Analysis - PaGe_026_3PB_MgO-C_WoodPellets-1000degC-TS950degC](#)
- [Testing & Analysis - PaGe_027_3PB_MgO-C_SunflowerSeedHullPellets-1000degC-TS950degC](#)

Conclusions:

- The replacement of graphite NFL by carbonized wood and sunflower seed hull pellets marginally reduces the bulk density and increases the apparent porosity after pressing and carbonization.
- The replacement of graphite NFL by sunflower seed hull pellet coke does not influence Young's modulus of elasticity after carbonization.
- The SEM is appropriate to display the graphite and biomass cokes within the microstructure. All types of carbon are well integrated into the microstructure but cannot actively reduce the pores between the MgO grains, as they do not fill the majority of the pores.
- Disregarding the lower strength value, the thermal shock resistance of the wood pellet coke containing MgO-C is at the same level as the reference sample with flaky graphite.

Figures:

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- [Testing & Analysis - PaGe_019_LightMicroscopy_MgO-C_BiomassPellets](#)
- [Testing & Analysis - PaGe_020_SEM_MgO-C_BiomassPellets](#)

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Title

The influence of biomass cokes on the microstructure and thermal shock resistance of MgO-C refractories.

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Linked experiments

Processing - [PaGe_002_Mixing_MgO-C_GraphiteNFL](#)

Processing - [PaGe_003_Mixing_MgO-C_WoodPellets](#)

Processing - [PaGe_004_Mixing_MgO-C_SunflowerSeedHullPellets](#)

Processing - [PaGe_005_Pressing_MgO-C_BiomassPellets-120MPa](#)

Processing - [PaGe_006_ThermalTreatment_MgO-C_BiomassPellets-1000degC](#)

Simulation - [PaGe_002_FactSage_Equilib_Oxynitrides](#)

Testing & Analysis - [PaGe_007_HydroWeigh-Archimedes_MgO-C_GraphiteNFL-pressed](#)

Testing & Analysis - [PaGe_008_HydroWeigh-Archimedes_MgO-C_WoodPellets-pressed](#)

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Testing & Analysis - [PaGe_016_UltrasonicRuntime_MgO-C_GraphiteNFL-1000degC](#)

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Attached file

The Influence of Biomass Cokes on the Microstructure and Thermal Shock Resistance of MgO-C Refractories.pdf

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