



Recovery and Treatment of Metallic Ores/Concentrates via Selective Carbothermic Reduction and Smelting (SCRS) Process

Mineral deposits never consist entirely of a single ore mineral. Because they are always mixed with gangue minerals, upgrading the desired minerals and separating the gangue minerals is necessary to produce suitable raw materials for further processes. Only mineral deposits (ores) that can be mined, upgraded and sold at a profit are currently beneficiated. The rest (at lower concentrations or less easily acquired) are often left in the ground, so large reserves of mineral deposits remain underutilized while other reserves that require little or no upgrading are subject to rapid depletion.

Description of the Invention

Selective carbothermic reduction and smelting (SCRS) process is a new method for treating ores/concentrates that cannot be treated via conventional mineral processing techniques. The method, for upgrading ferro-metallic ores/concentrates, is useful for concentrating and extracting metals from ore containing iron and other metals. SCRS process acts as a concentration step to beneficiate low grade metallic ores that contain iron and one or more metals (such as manganese (Mn), silicon (Si), calcium (Ca), aluminum (Al), barium (Ba), magnesium (Mg), titanium (Ti), or vanadium (V)). Low-grade raw materials are blended with carbonaceous material and flux (as needed) to completely reduce and carburize metal intended for removal. This metal is then separated from a fusible slag, which has affinity to the other metals in the low-grade ore. It is a less energy intensive method with steps that can be repeated to selectively recover metals sequentially and transform them into commercially usable products.

Features and Benefits

- Profitably processes metallic ores/concentrates that contain iron and one or more metals
- Selective carbothermic reduction and smelting (SCRS) has fewer, less energy intensive beneficiation steps
- Recovers iron, chromium, manganese, vanadium, silicon, titanium, barium, aluminum, magnesium, or calcium as metals, metal oxides (such as MnO_2 and TiO_2) or metal sulfide ($BaSO_4$)
- Can be applied to beneficiate ores mined using current mining practices

Potential Applications

- Beneficiating low grade ore and slags containing iron, chromium, manganese, vanadium, silicon, titanium, barium, aluminum, magnesium, or calcium

Technology Status

Proof of concept/testing on laboratory scale.

IP Status

Patent Pending

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Case Reference

20180047
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