SUCCESS STORY

K1-MET
Competence center for Advanced Metallurgical and Environmental Process Development

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HIGHER ADDED VALUE FOR STEELMAKING AND COPPER REFINING SLAGS

NEW TREATMENT PROCESSES AND COOLING METHODS CAN SAVE RESOURCES AND CO_2 EMISSIONS

The metal and cement industries are among the energy-intensive sectors, and thus, also the major emitters of CO_2. Therefore, there are numerous efforts to develop new processes to link these industries more closely, to use by-products and to save resources and CO_2 by a better industrial symbiosis.

Therefore, processes are currently developed in the laboratories to transform steelmaking slag in such a way that it can be used in construction industry (e.g. cement industry) to save emissions by substituting primary resources.

The treatment method involves modifying steelmaking slag in a way that it leads to cementitious properties and contributing to strength, similar to cement produced with primary materials. Since more than half of the CO_2 emissions in the cement industry are related to raw materials, these emissions cannot be reduced below this limit even with optimum processes. However, the use of transformed steelmaking slag makes this possible. At the same time, metals can be recovered from the slag and recycled to the steelmaking process in the optimum case. This generates a significant added value and saves resources.

Reducing agents are necessary for the reducing slag treatment to reduce oxidic iron and other metals from the slag. At the same time, the molten slag is

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chemically modified in a way that it can be used as alternative material for the construction industry.

By quenching the slag starting with a temperature of approximately 1,650 °C, it is broken down into a granulated mineral product, which virtually freezes the energy. This energy is slowly released on contact with water and leads to formation of strength.

Laboratory tests have already shown that the cement properties produced are comparable or even significantly better than those of granulated blast furnace slag. The aim of the ongoing work is now to further improve performance in collaboration with the involved industrial partners, while at the same time considering economic and ecological conditions.

This includes, among others, the required quantity of reducing and conditioning agents, the lowest possible treatment temperature, and the metallurgical process itself, which must take place without influencing the main steel production.

Furthermore, slags from copper production are also investigated. In addition to improving the process and reducing material losses, new fields of application for these slags are tested.

Water granulation in melting laboratory of FEhS – Building Materials Institute

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