

Recycling of Mineral Waste Materials by Geopolymerization – First Results

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The building and construction industry is responsible for 40 % of the anthropogenic CO₂ emissions and consumes enormous amounts of resources. In recent decades, there has been a significant increase in the production of waste, of which mineral waste is the largest stream in Austria, accounting for 76 % of the total waste. It is currently mostly disposed in landfills. To counteract the negative environmental impact of building and construction and to reduce the amount of landfilled waste, a Christian Doppler Laboratory for waste-based geopolymer construction materials in the CO₂-neutral circular economy (GECCO₂) was launched at Graz University of Technology. The goal is to produce environmentally friendly, highly resilient and Portland-cement-free geopolymer construction materials, also known as alkali-activated materials, from currently unexploited mineral waste materials. These geopolymers are then to be used in, for example, the environment of biochemically aggressive waste systems, such as sewer manholes, tanks and basins, or biowaste treatment facilities. Tasks of the Chair of Waste Processing Technology and Waste Management at the Montanuniversitaet Leoben, include the identification and selection of relevant mineral waste streams and the mineralogical, chemical and environmental characterization of selected waste materials, and elaboration of potential pretreatment strategies. With the obtained results, a material portfolio of suitable Austrian waste materials and industrial by-products will be created. First results will be presented regarding the mineralogical and chemical characterization of the selected waste materials.