

With a production of approximately 4.1 billion tons per year (resulting in approx. 14 billion tons of concrete) cement is the most common anthropogenic material. Its production releases 0.6-0.7 t_{CO_2}/t_{cement} . Due to the produced amounts a lot of technological and material scientific effort is needed to make cement sustainable. A very relevant contribution to lower its CO₂ footprint, while superior durability performance, is the use of secondary cementitious materials (SCMs). Due to Europe pushing for sustainable energy production and circular economy the commonly used fly ashes and blast furnace slags need to be replaced. This talk will illustrate how upcycling unused inorganic wastes into tailor made SCMs is an essential step towards “net-zero” cement. We will discuss the example of Bauxite residue (waste of the Bayer-process), as Europe’s largest waste stream of non-ferrous metallurgy. It will be shown how this material can be turned into an SCM of unique properties that affects the micro- and macroscopic properties of blended cements.