Environmental Friendly Ceramic Building Materials

Toyohiko Sugiyama
National Institute of Advanced Industrial Science and Technology (AIST), Japan
Email : sugiyama.toyohiko@aist.go.jp

The global warming is one of the most serious problems. The decrease of CO_2 emissions in our daily life is an important subject today. Recently, an application of water retentive materials as a paving material has attracted a great deal of attention in Japan. This material is effective for reducing heat island phenomenon, which is also a recent problem in many cities in Japan. Water retained in the material during rainfall evaporates when heated by sunshine. The latent heat absorbed by evaporating water works to cool the surroundings. The water retentive ceramic products are expected to be useful for building materials as well as pavements. Several performances is however required on the water retentive ceramics when it is used as building materials. Its cost and quality are the important factors. Porous ceramic materials formed by pressing without firing is one of ideal low cost and eco-friendly candidates. The porous ceramics is also expected to be produced from recycled ceramic materials. By optimizing its composition and forming method, a water retentive material with high performance was developed. The trial product had the properties as follows; fracture toughness: 1300N, bending strength: 175N/cm, water absorption: larger than 30%, and precision in size (length): +-0.5mm for 150mm. The product showed also enough frost resistance. In this paper, the fundamental properties of the porous ceramics prepared without firing are discussed with referring to the results of the field experiments.

Another subject recently studied by several tile makers in Japan is the glazed tile with high solar reflectance. The exterior walls covered with such a high solar reflectance tile keeps the surface temperature of the wall lower under the strong sunshine of summer. It is effective against heat-island phenomenon. In this paper, the outline of the research results on visible and infrared reflectance of many kinds of glazes is also discussed.