

STONE AS SENSOR MATERIALS FOR MONITORING ENVIRONMENTAL INFLUENCES

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The problem of decay of stone monuments due to environmental impacts demands new methods of assessment of weathering processes in their early stages. An new approach is in-situ monitoring by sensor materials. Metals and glasses proved useful for these purposes. A different, very effective approach offer stone materials. Because of their physical-chemical properties they are particularly apt for monitoring objects constructed of porous materials and may be specifically selected for specific applications. Samples (5x5x1cm) of four different, well characterized stone types (Baumberg calcareous sandstone, Westfalia/FRG, Obernkirchen quartz-sandstone, Lower Saxonia/FRG, marbles from Laas and Sterzing, South-Tyrol/Italy) were exposed under both dry (rain-protected) and wet (exposed to rain) conditions for 1.5 years at three exposure sites. Two sites in Innsbruck (lbf and lbkU) stood for variable urban climate and immission situations, a site at Obergurgl/Ötztal Valley (ÖtztOG), represented high alpine, low pollution conditions. For the sites lbf and lbkU our dry exposure experiments yield pronounced dependences between air pollution/deposition, change in mass, surface structure and -color. For the wet exposed samples the pattern are complex due to masking effects (production of mainly sulphat and rain leaching). The samples from the ÖtztOG site are predominantely influenced by the action of frost-thaw-events. Our results allow a good correlation to previous studies proving an excellent applicability of these stones as sensors materials at low costs.