Development of the Gypsum Board Materials Containing Eggshell Aiming at the Solution of Sick Building Syndrome

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The egg shells has the capacity to adsorb chemicals. The purpose of this study was to apply this property of egg shells to the maintenance of human health. I hypothesized that if egg shells are incorporated into building materials, then the adsorption capacity of the shells would lead to a reduction in toxic substances, such as formaldehyde. If effective, this technique could therefore be applied to solving problems such as sick building syndrome. I attempted to verify this hypothesis by selecting gypsum as a building material and mixing it with egg shells. Bending strength evaluations of gypsum board-shaped members containing egg shells revealed that the strength of the boards was not compromised when the content of egg shells in the gypsum was 10% or less. Compared to drywall incorporating seashells, which are also composed of calcium carbonate, the gypsum displayed higher strength. Next, we placed the drywall containing egg shells in a box containing 30 ml of formaldehyde and measured the change in formaldehyde concentration of the air in the box. The results showed a substantial decrease in the formaldehyde concentration in the box. Furthermore, using drywall with an egg shell content of at least 5%, the formaldehyde concentration could be limited to 0.08 ppm or less. I also studied the adsorption of smoke from incense to examine the response of the drywall to airborne particles consisting mainly of microscopic organic matter, known as PM2.5. The results showed that adsorption of PM2.5 by the drywall containing egg shells was substantial. These findings verified that drywall with an egg shell content of 5 to 10% is well suited for use as a building material that is cost effective, does not contain toxic chemicals, and can prevent sick building syndrome.

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