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Preparation of humidity control materials by recycling inorganic sludges**Chi-Hong Kuok and Shou-Heng Liu**
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The annual output of inorganic sludge was estimated to be 5.5 million tons in Taiwan. In general, these sludges can be applied to soil to improve nutrients and also be used as building materials. Actually, the recovery rate is low and most of the sludge would be deposited to landfill, which is the easiest way for waste treatment. However, it will cause some problems such as saturation and pollution. Therefore, re-using it economically is viable and environmental friendly. Indoor humidity environment is related to healthy and energy consumption. High relative humidity will promote mold, mildew, dust mites and bacteria growth rapidly. In addition, it also makes the feeling of body discomfort. Thus, humidity control materials was developed in the country with high relative humidity problem, such as Japan, Taiwan, etc. In this study, humidity control material was prepared from ESF (Enhancement Silica Fume), which was inorganic sludge from traditional industry. Experimentally, moisture adsorption-desorption performance of the humidity control materials increases as ESF increases. The results showed that ESF coating is provided with mesopores structure, the moisture adsorbed value is 0.232 kg/m², which was better than other two commercial coatings. According to BET analysis, the isotherms of ESF coating exhibited type-IV, hysteresis behavior with a characteristic step down on the desorption and capillary condensation occurs in a mesopores, the pore size distributions of ESF shows the peak ranging from 2-50 nm.

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