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## Transferring waste plastics into sound absorption material

Fu-Shen Zhang and Lei Wang

University of Chinese Academy of Sciences - China

A comprehensive sound absorption material was developed using waste agricultural plastic film as raw material. The new material exhibited excellent sound absorption capability in both low- and high-frequency ranges and had a complex structure with perforations, cavities, and an air layer. The optimal average sound absorption coefficients of the material were 0.44 and 0.53 within the frequency ranges of 200–1600 and 500–6400 Hz, respectively. Furthermore, the low-frequency absorption range of the material could be adjusted according to the actual noise absorption requirements, thus broadening its application ranges. The density of the material is 0.55 g/cm<sup>3</sup> while its thickness is only 1 cm. Thus, it is lighter than most conventional sound absorption materials. The compressive strength of the samples were  $0.56 \pm 0.01$  MPa (unmanufactured),  $0.51 \pm 0.01$  MPa (4 perforations) and  $0.45 \pm 0.02$  MPa (4 perforations and 12 cavities) respectively and, its flexural strength was  $91.2 \pm 1.22$  N. Interfering tests indicated that water coverage could decline the sound absorption efficiency in all frequency ranges, while sand coverage only declined the low frequency absorption, but increased the high frequency absorption effect of the material. Accordingly, it is believed that the new waste-derived material is quite suitable for application on bridges and inside tunnels during high-speed road construction, and also appropriate for using as parts of vehicles and ceilings.

ffsszz@163.com