Laminated Specimens of polystyrene foams for microscopic observation of two-dimensional structure

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Foam is a collection of bubbles made from liquid or solid materials surrounding a continuous phase that tends to minimize its surface energy under volume [1]. Today, foams are used for variety of commercial products using their light-weighted and squasy characteristics. In scientific researches, these characteristics have been usually studied from mechanical and mathematical points of view with help of experimental and computational techniques [2, 3]. In Japanese high school, objects based on foam structure appear in science textbooks and classes, yet, very little attention has been paid to their microscopic structure that is the base of above characteristics. While the increase in need of teaching about connections between science and everyday life in school, there are few teaching tools, and almost none to observe structures of foams in daily products. We therefore came up with a teaching material to observe two-dimensional (2D) structure of polystyrene foams with a microscope. The specimen is made with a thin slice of polystyrene foam—cut from a Styrofoam box—laminated in between polyethylene terephthalate (PET) films, and can be observed as Figure 1 under a microscope. Using this teaching material, we proposed a learning activity to study the polygonal structure of polystyrene foams for high school students. Students, with these specimens, successfully learned physical properties of polystyrene foams and investigated the distribution of polygons with \( n \)-edges in the foams. Once they learned about foams itself, then students can expand their learning to connect the foam structure to everyday life and products.


Fig. 1 A typical image of laminated polystyrene foams. Scale bar length is 0.1 mm.