Alumiracle: Coloring Anodized Aluminum with Natural Dyes

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Anodized aluminum has an artificial oxide film on its surface and is used for household products such as metal dishes or tea kettles. In general, synthetic dyes are used for coloring anodized aluminum. However, these dyes contain heavy metals, and so there may be a harmful influence on the human body.Hence, it is necessary to use natural dyes, which are highly safe and are used in various fields. To find the most appropriate conditions, we attempted to color using two kinds of dye: i) charged dyes, and ii) dyes suitable for textiles.We found that pigments with low water solubility were more suited for coloring anodized aluminum, and there was a difference between the stained color and the liquid color. Based on these results, we hypothesized that Al3+ and the pigment may form some type of bonding interaction. To verify this hypothesis, Al3+ and the dye were mixed in a test tube, and changes in color were observed. The color change is thought to be because the dye has low water solubility, and thus has the propensity to form a complex with Al3+. In this study, we succeeded in developing a method for coloring anodized aluminum using natural dyes, and revealed that the coloring is caused by complexion of Al3+ and the pigment. We are currently working on a process that allows anyone to create and color anodized aluminum at home.That because we want to make coloring of metal more familiar.