4th GSC Encouragement Award

Development of Durable Water-borne Polyurethane Coating Materials

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Various water-borne coating materials have been developed in order to reduce the emission of volatile organic compounds (VOC). In general, water-borne coatings show lower durability than solvent-borne coatings. Polycarbonatediol (PCD) based polyurethanes have been used for durable coatings because PCDs have higher water resistance, chemical resistance, and light resistance than polyetherpolyols or polyesterpolyols which are conventional raw materials for polyurethanes. However, the variety of polyurethanes containing PCDs in water-borne coatings has been limited due to low water dispensability of them.

We developed polyurethane dispersions (PUDs) having PCDs for durable water-borne coating materials by controlling a water dispensability. Furthermore, the introduction of alicyclic PCDs, heat or light reactive functional groups, and/or "drying auxiliary groups" improved the durability of water-borne polyurethane coatings.

As a result, PUDs with PCDs have been used for durable coating materials such as floor, rubber, and automotive interior or exterior coatings instead of solvent-borne coating materials.

Development of high performance PUDs found new market of water-borne coating materials. Therefore, 80-90% VOC as diluting agents of solvent-borne coating materials could be reduced.

We believe that the expansion of the application of PUDs leads to less emission of VOC and contributes to Realization of Low-Carbon Society.