

温湿度制御型紫外線照射装置による 光劣化メカニズムの温度依存性

—建築材料用ウレタン塗膜の物理化学的性質変化— Temperature Dependency of Photodegradation Mechanisms by Using Temperature and Humidity Controlled UV Irradiation Equipment —Physical and Chemical Properties Change on Urethane Coatings for Building Material—

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Abstract

Organic coatings for building exterior walls are attracting a lot of attention because of the requirement for long-term usage of buildings and constructions. Polyurethane (PU) has been commonly applied on building exterior walls. UV irradiation tests were carried out in a low RH condition (<10%) at several surface temperatures by using our equipment which can control both humidity and temperature of film surface in accelerated UV irradiation. For irradiated samples, IR and Raman spectra were measured to study change of chemical structure. Furthermore, we also investigated elastic modulus with ultrasonic instrument. Irradiated samples didn't yellow on exposure test because of the absent of increase in double bond groups (C=C, C=O). In terms of temperature dependency of degradation reactions, Photo-Fries reaction seemingly doesn't depend on temperature, whereas Norrish type reactions are promoted by temperature elevation. Moreover, we investigated the relationship between aggregate-state and change of elastic modulus, in early stage, it shows a better correlation between them than in later stages.

キーワード：光劣化機構、温度依存性、低湿度環境、建材用ウレタン塗膜、物理化学的劣化

Keyword : Photodegradation Mechanisms, Temperature Dependency, Low RH Environment, Urethane Painting for Building Material, Physical and Chemical Degradation

1. 諸 言

近年、建築物及び土木構造物など社会資本ス

トックの長寿命化などの社会的要請により有機高分子塗料等の仕上塗材への関心は国際的にも高まっている。日本塗料工業会によれば¹⁾、現在の日本における塗料生産量は堅調に推移している。世界でもアジア・アフリカの発展に伴い、特にインフラ・建築分野での需要はさらに高まっており、塗料の性能確保とさらなる向上

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