

プローブ DLS による生体適合性ゲルの網目構造解析

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Network structures of biocompatible hydrogels revealed by probe DLS measurements

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Poly(oligoethylene glycol methyl ether methacrylate), (pOEGMA) gels have the characteristic properties, such as high biocompatibility, large swelling degree, and so on. Indeed, pOEGMA gels are studied to apply the biomaterials. However, their network structures are still unclear. To reveal their structure, the dynamic light scattering (DLS) measurements were applied, but the scattering intensity from the gels was low because of low refractive index difference between the gel and solvent. Therefore, in this study, the network structures of pOEGMA gels were evaluated by probe DLS using silica nanoparticles, where the sufficient scattering intensity can be observed from nanoparticles. The nanoparticles exhibited the different movements depending on the gel conditions in the cell (Figure 1).

Keywords : Probe dynamic light scattering; Silica particles; Hydrogels; Network structures

ポリオリゴエチレングリコールメタクリレートゲル(pOEGMA)は、高い生体適合性を有することや、温度応答性を示すことから生体・医療材料に応用できると期待されている。応用する際には、ゲル網目の構造が物性や機能に大きく影響するため、網目構造を評価する必要がある。動的光散乱法(DLS)は、ゲル網目の評価法として有用だが、溶媒との屈折率差が小さいゲルは散乱光強度が低く測定が困難である。そこで、本研究はゲル網目や溶媒と屈折率差が大きく、散乱光強度が高い微粒子をプローブに用い、ゲル網目内におけるプローブの拡散挙動から pOEGMA ゲルの網目構造解析を試みた(Figure 1)。

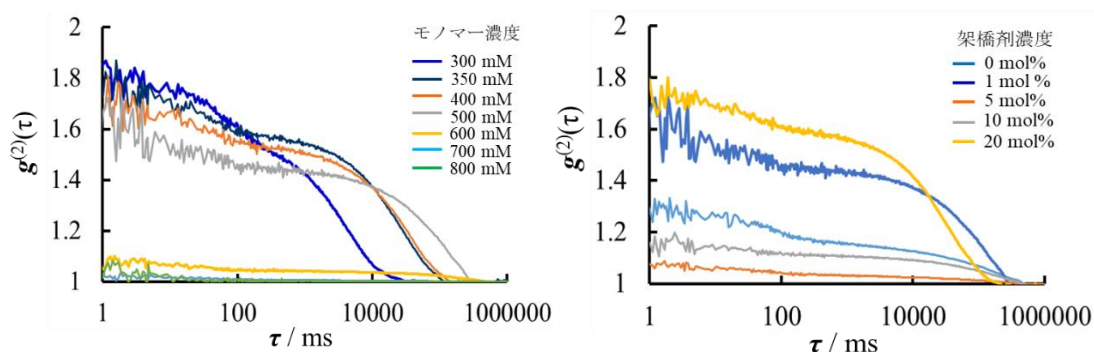


Figure 1. Time-correlation functions of probe particles in pOEGMA gels: dependence of (a) monomer concentration and (b) cross-linking concentration.