Hydrotropes and Polymers: Application of Hydrotropic Property to Hydrotropic Polymeric Micelles

정재현, 이상천, 이재휘[1], 조용우[1], 허강무[2], 박기남[2], 김종득*
KAIST; [1]Akina Inc.; [2]Purdue University
(kjd@kaist.ac.kr*)

Hydrotropic agents are freely soluble organic compounds which at a concentration sufficient to induce a stack-type aggregation, considerably enhance the aqueous solubility of organic substances, practically insoluble under normal conditions. Our approach here is to develop a new concept of hydrotropic polymeric micelles, which can be defined by combined properties of hydrotropy and micellar solubilization. We were interested in whether the introduction of polymeric forms of an identified hydrotrope into the cores of micelles could provide a solubilizing capacity for poorly soluble drug superior to existing polymeric micelle systems. Well-defined amphiphilic diblock copolymers, consisting of poly(ethylene glycol) (PEG) as a hydrophilic block and DENA-containing poly(2-(4-vinylbenzyloxy)-N,N-diethylnicotinamide) (P(VBODENA)) as a hydrophobic block, were successfully synthesized. Poorly soluble drug, Paclitaxel was efficiently loaded into PEG-b-P(VBODENA)s micelles by dialysis method, and the loading content of paclitaxel varied depending on the type of organic solvents block, block compositions and the initial feed weight ratio of paclotaxel to polymers. This study shows that polymeric micelles with hydrotropic structure have a high solublizing capacity with a long-term stability.