Abstract

Highly-exact structural characterization is the crucial step in the development and manufacturing process of pharmaceutical materials. Their structural composition is, however, often very complex and hardly identifiable. The eligible way for obtaining definite structural interpretation of these systems appears the high-resolution solid-state nuclear magnetic resonance (ssNMR) spectroscopy. For this purpose the reliable tool – the ssNMR toolbox for comprehensive characterization of various pharmaceutical solids is described. The rigorous optimization of ssNMR techniques is carried out on enormous number of measured samples containing active pharmaceutical ingredients (APIs) with systems ranging from APIs formulated in solid dispersions to pure forms revealing extensive molecular disorder. In this study the influence of polymeric matrix on the creation of solid dispersion type susceptible for finely tuned controlled drug release is likewise discussed. The distinction between variable structural alignments of API molecules in 3D dimension of complicated pharmaceutical solids is allowed via simple strategy – factor analysis applied to hardly describable ssNMR spectra (^{13}C CP/MAS NMR and ^{19}F MAS NMR). The results of this ssNMR investigation contribute to better understanding of solid dispersion systems based on the polymer matrices and of the systems with very subtle and hardly describable spectra.