



“Opportunity for Inorganic materials in Nanomedicine ; Drug Delivery Systems”

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Abstract:

Some challenges have been made to realize new inorganic nanohybrids functionalized with organic or inorganic molecules (1). Recently we were quite successful in demonstrating that a two-dimensional inorganic compound like layered double hydroxide (LDH), and natural and synthetic clays can be used as gene or drug delivery carriers. To the best of our knowledge, such inorganic nano-cargos are completely new and different from conventionally developed ones such as viral-based DNA or naked ones, liposomes, polymersomes, and dendrimers, those which have been limited in certain cases of applications due to their toxicity, immunogenecity, poor integration, and etc. (2,3)

However, the present inorganic nano-cargos with drug delivery functions become more and more important in the future, since they allow imaging, and tissue and cell targeting functions (4,5). In this presentation, a novel nanohybrid concept of delivery nanovehicles encapsulated with drug or bioactive molecules is proposed to get breakthroughs in Nano Drug Delivery Systems (NDDSs). And at the same time, some experimental findings of new bio-inorganic nanohybrids are demonstrated on the basis of NDDSs, corresponding to 2-d inorganic nanocargos (LDHs) hybridized with genes or anticancer drugs, for gene- and chemo-therapy. (6~10)

Keyword: Biocompatible materials, 2D nanovehicles, Inter- and Intra-cellular drug trafficking pathways, Hybrid drug delivery systems, Chemotherapy, Genetherapy, Boron neutron capture therapy.

References: [1] J.H. Choy, S.J. Kwon, G.S. Park, *Science* 280, 1589 (1998) [2] J.H. Choy, S.Y. Kwak, J.S. Park, Y.J. Jeong, J. Portier, *J. Am. Chem. Soc.* 121, 1399 (1999) [3] J.H. Choy, S.Y. Kwak, Y.J. Jeong, J.S. Park, *Angew. Chem. Int. Ed.* 39, 4041 (2000) [4] J.M. Oh, S.J. Choi, S.T. Kim, J.H. Choy, *Bioconjugate Chem.* 17, 1411 (2006) [5] D.H. Park, J.E. Kim, J.M. Oh, Y.G. Shul, J.H. Choy, *J. Am. Chem. Soc.* 132, 16735 (2010) [6] J.M. Oh, D.H. Park, J.H. Choy, *Chem. Soc. Rev.* 40, 583 (2011) [7] S.J. Choi, J.H. Choy, *Nanomedicine* 6, 803 (2011) [8] D.H. Park, S.J. Hwang, J.M. Oh, J.H. Yang, J.H. Choy, *Prog. Polym. Sci.* 38, 1442 (2013) [9] G. Choi, O.J. Kwon, Y. Oh, C.O. Yun, J.H. Choy, *Scientific Reports* 4, 4430 (2014) [10] D.H. Park, J. Cho, J.H. Choy, *Angew. Chem. Int. Ed.* 55, 4582 (2016)