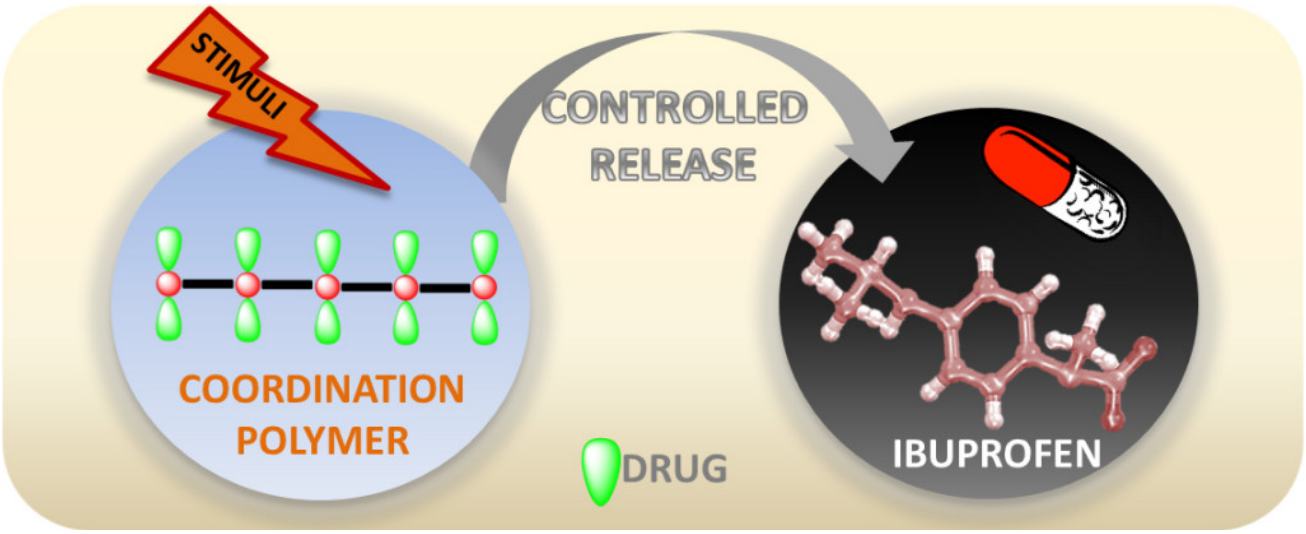
New systems capable of stimuli-controlled release of drugs

The search for new medical strategies with high therapeutic efficiencies and reduced adverse side-effects remains a challenge for the scientific community. The development of new drug delivery systems (DDS) to generate new solid forms of active pharmaceutical ingredients (APIs) has attracted increased interest in pharmaceutical materials science. In the reported study a new hybrid material composed of metal ions and organic bridging ligands that exhibit promising characteristics as drug carrier is presented.



Metal coordination entails attaching a pharmaceutically acceptable metal to a known pharmaceutical agent to create a new and more effective drug. The addition of the metal changes the way the drug is delivered without altering the way the drug works once delivered. Moreover, the addition of metal ions allows changes in the physicochemical and biological properties of the material.

Furthermore, an important goal in developing materials with pharmaceutical applications is to design biocompatible carriers with little or zero toxicity. In this sense, in the design of the carries it seems appropriate to include bioactive metal cations such as zinc, which is an essential nutrient for life and can also be used as an antibacterial growth agent. Moreover, stimuli-responsive controlled-release systems, which undergo physical or chemical changes in response to small changes in the environmental conditions, are highly desired. In comparison to sustained-release systems, these dynamic systems can achieve a site-selective, controlled-release pattern, which improves the therapeutic efficacy. However, it remains a challenge to find more convenient ways to achieve a fully controllable drug-release system under normal physiological conditions.

In our study, we describe a zinc coordination compound with a fully controlled architecture as a starting material for ibuprofen drug delivery. The compound presents high drug content and exhibit high stability, low cytotoxicity, good biodegradability and high biocompatibility, all these desirable

properties in drug delivery materials. The mechanism involved in the ibuprofen release process and the pH-controlled drug release was carefully studied. This system could also be regarded as a model for other drugs that contain the same chemical group (carboxylic acid).

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