# Engineering functional nanocomposites for oral vaccine delivery

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**Abstract**

Vaccination represents one of the most cost-effective means of preventing infectious disease in modern medicine. Subunit antigens such as proteins, peptides, mRNA and plasmatic DNA have been developed and used for vaccination. In recent years, oral vaccination has been considered as a promising method to improve patient experience and compliance for its convenient, safe and non-invasive superiority. However, the oral delivery efficiency is limited due to the unsatisfied immune response of oral immunization resulted from formidable barriers such as poor stability in the gastrointestinal (GI) tract, low mucosal permeability and inefficient presentation by antigen presenting cells (APCs). Nowadays, particulate delivery systems have shown great potential to increase oral vaccination efficacy. In this talk, I will share the recent research works on oral vaccine delivery that my research team has done.

To overcome the mucosal barriers, polysaccharides-inorganic nanocomposites have been constructed for oral vaccine delivery. Our polysaccharides-inorganic nanocomposites have shown strong protection of antigen degradation in harsh GI tract and improve mucosal penetration of antigens in the small intestine. After passing the mucosal layer, chitosan coating facilitated APC presentation. In vivo oral vaccination experiments have demonstrated that polysaccharides-inorganic nanocomposites induced strong mucosal and systemic immune response. In addition, these nanocomposites displayed the excellent adjuvant properties, which showed good macrophage stimulation and low cytotoxicity to macrophages and intestine cells.