**Mesoporous bioactive glasses as multifunctional devices for bone regeneration**

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Despite the significant progress in the field of advanced biomaterials,the treatment of bone fractures still represents a challenging clinical issue when complications due to compromised bone remodelling or bacterial infections occur.Hence, the design of a multifunctional device based on Mesoporous Bioactive Glasses (MBGs) able to stimulate bone tissue regeneration and at once inhibit bacterial adhesion represents an attractive strategy to face this challenge. MBG high surface area and tunable pore size allow the incorporation of therapeutic ions and drugs capable to impart specific biological functions such as pro-osteogenic effect.Moreover, to provide anti-adhesive properties and prevent bacteria colonization, zwitterionisation (i.e. equal number of positive and negative charges) represents a promising approach.

In this work, SiO2-CaO based MBGs containing strontium were prepared in form of nano and micro-particles and afterward loaded with drugs. The morphological and structural features and the presence of drug were investigated by FESEM, N2 ads-des, XRD, TGA/DSC; in addition, the ability to release the cargo and the *in vitro* bioactivity were evaluated.

MBG surface was functionalized by different routes based on silane chemistry and the successful zwitterionic functionalization was assessed by FTIR and zeta potential analysis.Biological assessment will be carried out to investigate the *in vitro* biocompatibility and the antibacterial capacity of the nanostructured materials.