Enabling new channels for mass cytometry

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To perform reliable and deep profiling of heterogeneous cell populations, analysis must be run on a single cell level and recover expression rate of as many proteins as possible in one experiment. Mass CyToF (Cytometry Time-of-Flight) technology enables high sensitive measurements and multiparametric analysis of cell suspensions. In this technique, cells are immunostained with antibodies labelled with isotopic metal cations. As a result, one particular protein matches one particular metal isotope which is detected by a mass spectrometer with high resolution.[1] Currently, 37 protein-metal pairs can be analyzed in a single assay, without interferences between tags; which is double than the commonly used flow cytometry technique. These metal tags rely on a water soluble polymer functionalized by metal chelates and is attached to the antibody *via* a maleimide linker (Figure 1a).[2]

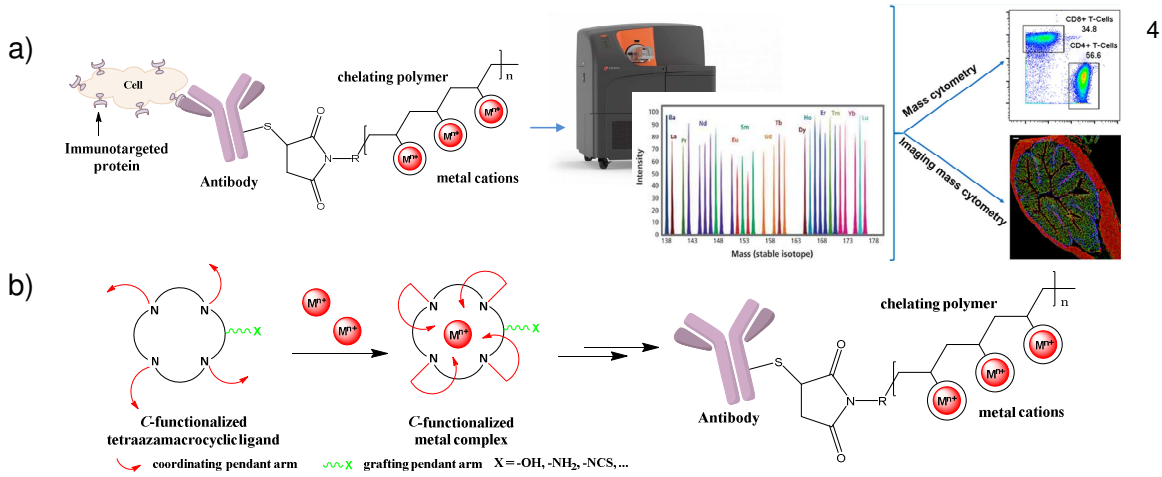

Figure 1 a) Mass cytometry principle; b) Tetraazamacrocylic-based chelates

In order to take advantage of mass cytometry, new metal isotopes must be used and therefore metal-specific chelators must be designed. Tetraazamacrocycles are well-known to specifically complex a large variety of metals and to form kinetically inert and thermodynamically stable complexes with metal cations.[3] Additional reactive groups can be added on the macrocyclic platform, specially by *C*-functionalization, for the grafting on the polymer (Figure 1b). The specifications required and recent results, from synthesis to application, will be discussed.

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