

# **Biomimetic assembly of chitin and protein to model virus interaction with insect's mouthparts**

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This work aims at understanding and characterizing the interactions between proteins bearing a chitin-binding domain (CBD) and chitosan, with the objective of elaborating a biomimetic platform of the cuticle of the acrostyle of aphid stylets, which cuticle is involved in viral vector transmission of numerous non-circulative phytoviruses. The interactions between proteins, with or without CBD and chitosans of different DAs (0.5% to 76%), were studied by fluorescence microscopy and by quartz crystal microbalance with dissipation monitoring (QCM-D). The first method allowed to discriminate the specific interactions associated to the presence of CBD on the proteins and the quantification of interaction sites between the two entities. The second method confirmed the observed tendencies with a dynamic model (flow) compared to the static layer-by-layer endpoint model of fluorescence microscopy. In order to elaborate the biomimetic platform, a chitosan (DA 67%) – cuticular protein (Stylin-01) film was chemically grafted to an epoxy-functionalized glass slide. The orientation of the protein in the film and its biological function (retention of the viral protein P2 of CaMV) were assessed to confirm the biomimicry and operational features of the platform.