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QCM-D and Neutron Reflectometry Study of Effect of Plasma Tretament on Cellulose-Mucin Interactions Towards ETSA

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Epidemic thunderstorm asthma (ETSA)[1] is associated with inhalation of airborne pollen grains and aerosolized pollen fragments, causing hypersensitive immune reactions[2] that might lead to an asthma attack. The wall of pollen grains (intine) contains cellulose which is hypothesized to initially interact with the nasal and tracheal mucous layer[3] when inhaled. The air-way mucous layer is comprised of mucin (a major glycosylated proteinaceous element) and water, which serves as a first-line-of-defence against inhaled pollen particles. Although immunological and meteorological studies have been conducted in this regard, the fundamental cause and mechanism of ETSA are under-investigated. This study is focused on unraveling inherent cellulose-mucin interactions employing quartz crystal microbalance with dissipation (QCM-D) and neutron reflectometry (NR) examining the adsorption of mucin on cellulose while mimicking a thunderstorm environment, such as the affect of plasma treatment on cellulose-mucin interactions. Here, we generate air-plasma and plasma-activated water to treat our model cellulose surfaces[4], simulating the ionized surface chemistry of thunderstorm-borne pollen particles and examine subsequent interactions.

In this poster, we describe the use of QCM-D and NR to investigate cellulose-mucin interactions and the effect of plasma treatment on these biointerfacial interactions. The advanced molecular and structural data obtained from this study, coupled with immunological and meteorological investigations, will enable the mechanistic understanding, treatment, and prevention of ETSA.

References

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Level of Expertise

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Do you wish to take part in the poster slam

Yes

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