

## APPLICATION NOTE | Failure Analysis of Fluid Absorbent Pads

Fluid absorbent pads can be used in many areas such as bladder pads, incontinence pads, puppy pads and etc. The surface properties of the top layer play a critical part in fluid absorption. The top layer normally consist of materials that are hydrophilic to help adsorb water-like fluid as quick as possible. In this study, we examined water absorbent pads that were aged and showed significant increases in absorption time using Time-of- Flight

Secondary Ion Mass Spectrometry. This pad is a multilayer film with non-woven fabric at the top, followed by adhesive, tissue paper and water absorbance polymers in the middle and polymer film at the bottom. Edges of the pad contain the non-woven fabric, adhesive and polymer film. Pad center and the edge that has direct contact to pad center turn out to be hydrophobic. We label them as “bad areas”.

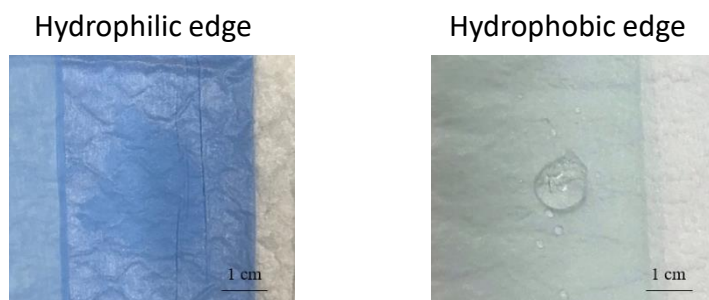


Figure 1. Pictures showing the water absorbance on good edge and degraded edge of a pad.

The entire top surface of the pad including center pad area and edges consists of non-woven fabrics. Figure 2 shows the positive ion ToF SIMS spectra of non-woven fabrics, good edge, bad edge and pad center area. The data indicate that the chemical composition of the good edge is similar to the non-woven fabrics, whereas the bad areas

contain high amount of hydrocarbon fragments but lower amount of surfactant fragments such as amine ions and sulfate ions, which play an important role on water absorption. This indicates that the bad areas are either contaminated by hydrophobic materials or the surface surfactant is removed by direct contact over time.

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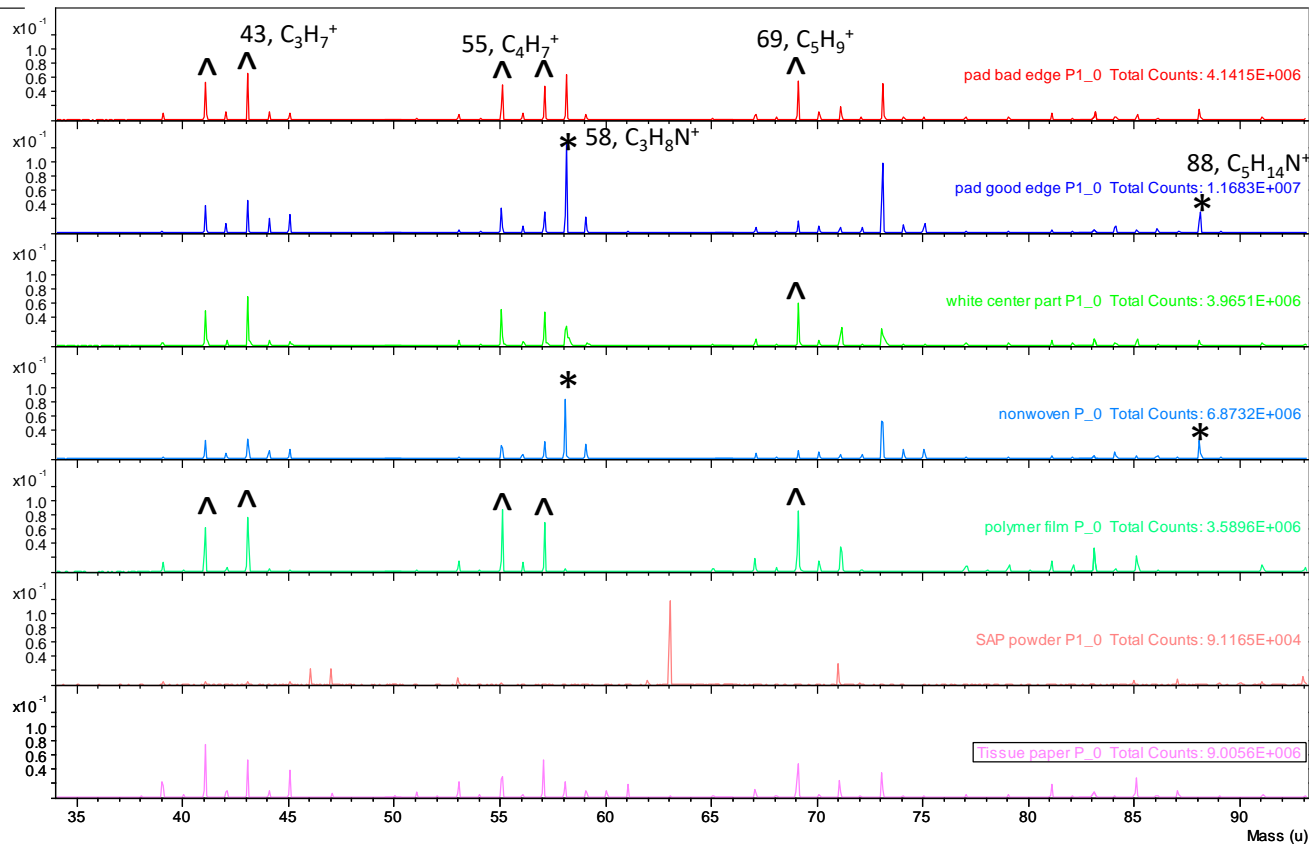


Figure 2. High mass resolution positive ion ToF SIMS spectra showing the surface chemistry of bad edge, good edge, pad center, non-woven fabric, polymer film, SAP polymer and tissue paper.

To clarify the root cause, further analysis of materials including the tissue paper, SAP water absorbance polymer and polymer film were carried out using ToF SIMS. Tissue paper and SAP polymer do not contain high hydrocarbon fragments but the bottom polymer film does. If the hydrocarbon contamination

is leached out from polymer film, this should occur to both pad center and all edges. Therefore, it is unlikely the relatively higher hydrocarbons are the problem. Surface surfactant was absorbed by the underneath water absorbance polymer over time is considered to be the main issue.