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Supporting Information

Surface Polymerization of Perfluorosilane Treatments on Paper Mitigates HF Production upon Incineration

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Table 1. Polymer decomposition upon incineration and their respective by-products, as primarily summarized by Craig and Beyler.[1-2]

Polymer Materials	By product upon incineration
Polyolefins: **Low-density polyethylene (LDPE)** **High-density polyethylene (HDPE)**	Decomposes to its monomer. Formation of mostly hydrocarbons
Polyethylene (PE)	Formation of alkenes and alkanes
Polypropylene (PP)	24% pentane, 15% 2 methyl-1-petene, 19% 2-4 dimethyl-2-heptene
Poly(methyl methacrylate) (PMMA)	Decomposes to its monomer and forms an extensive amount of char
Poly(methyl acrylate) (PMA)	It is assumed 100% decomposition due to little formation of monomer
Polyacrylonitrile (PAN)	Formation of ammonia and hydrogen cyanide. Vast amount of carbon is formed allowing it's used for production of carbon fibers.
Fluorides: **Polytetrafluoroethylene** **Polychlorotrifluoroethylene** **Fluorinated ethylene propylene**	Fluorine based polymers decomposes into hydrofluorocarbons monomers via an unzipping process in the chains upon exposure to high temperatures. Formation of double bond in the chains is common upon zipping that leads to a small and negligible amount of HF in the gas phase.
Cellulose	Around 700K it forms graphite carbon. It can also form laevoglucosan

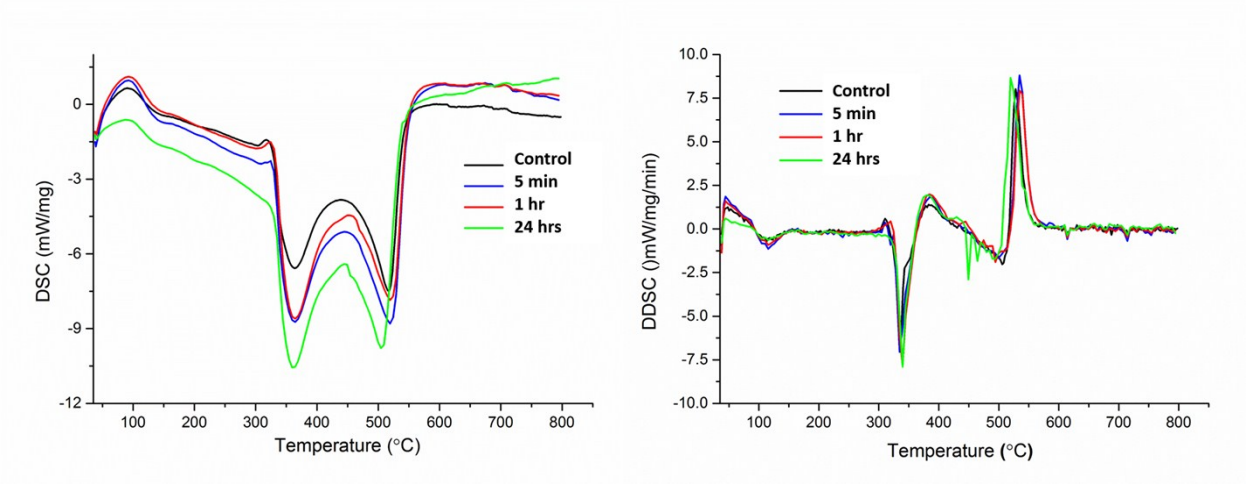

Figure S1. (a) DSC and (b) first derivate DSC spectrum for treated paper at different reaction times.

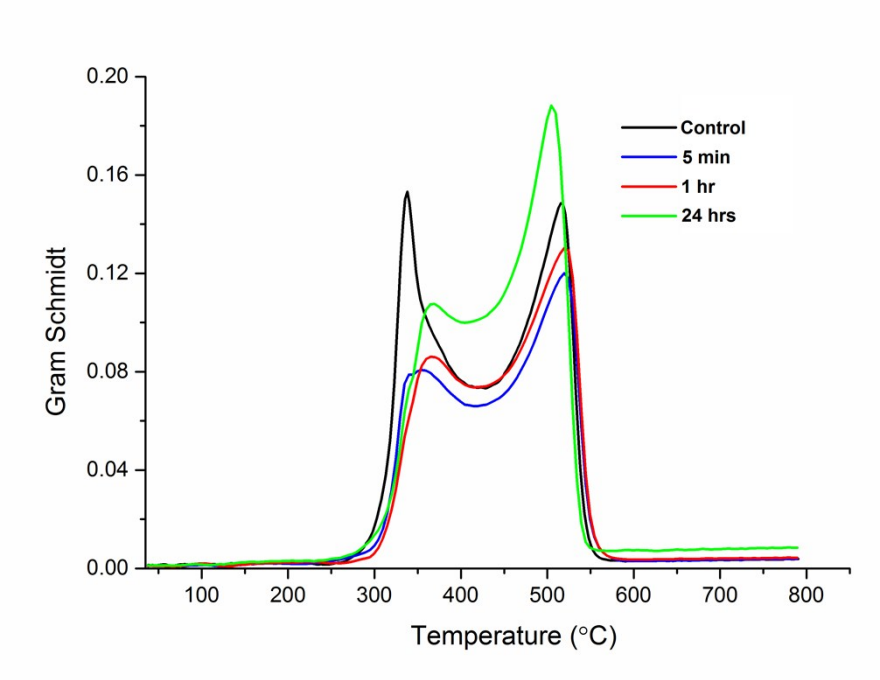

Figure S2. Gramm Schmidt plot for all reaction times performed with a high grammage blotting paper after treatment with a fluorinated silane.

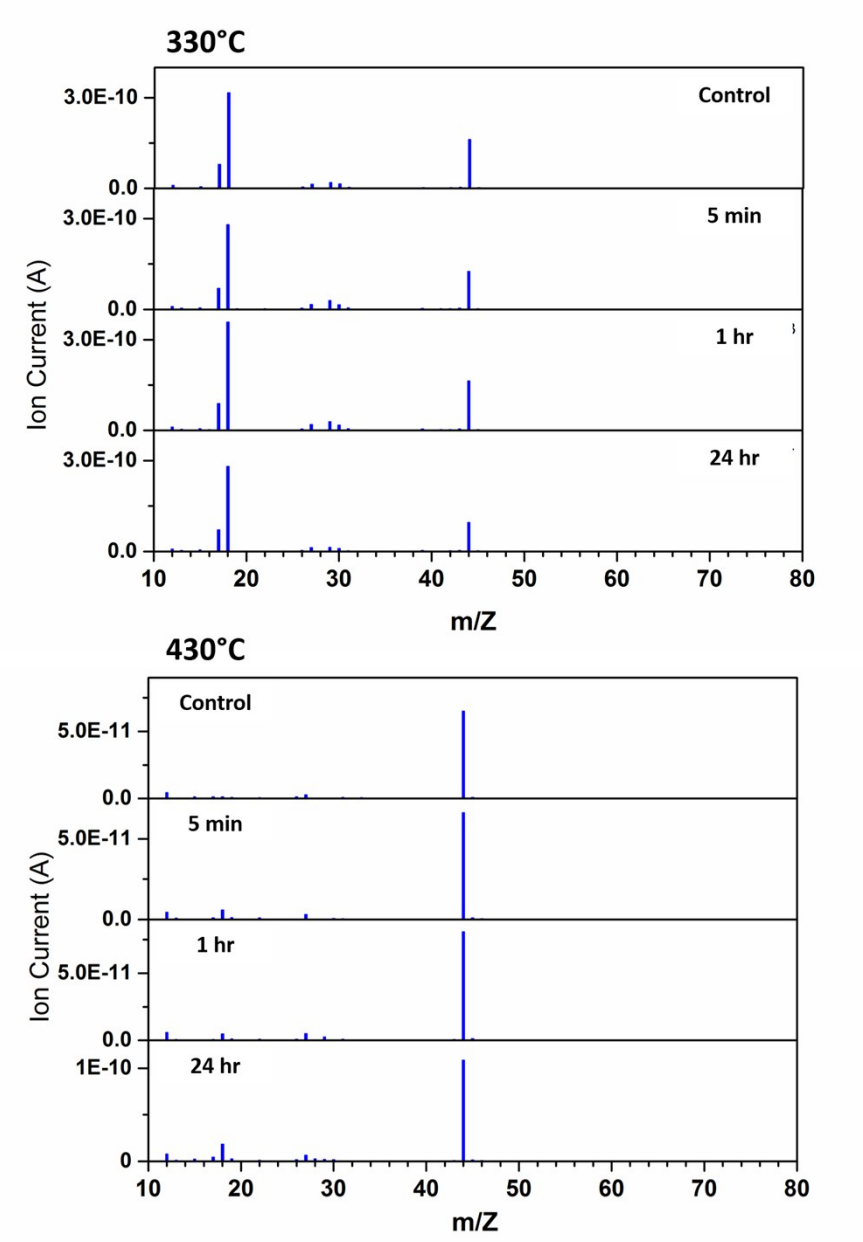

Figure S3. The Mass Spectra of the evolved gas at 330 °C and 430 °C, derived from thermal decomposition of the fluorinated hydrophobic papers with different reaction time (with larger m/Z range) no gas was detected with m/Z value larger than 50.

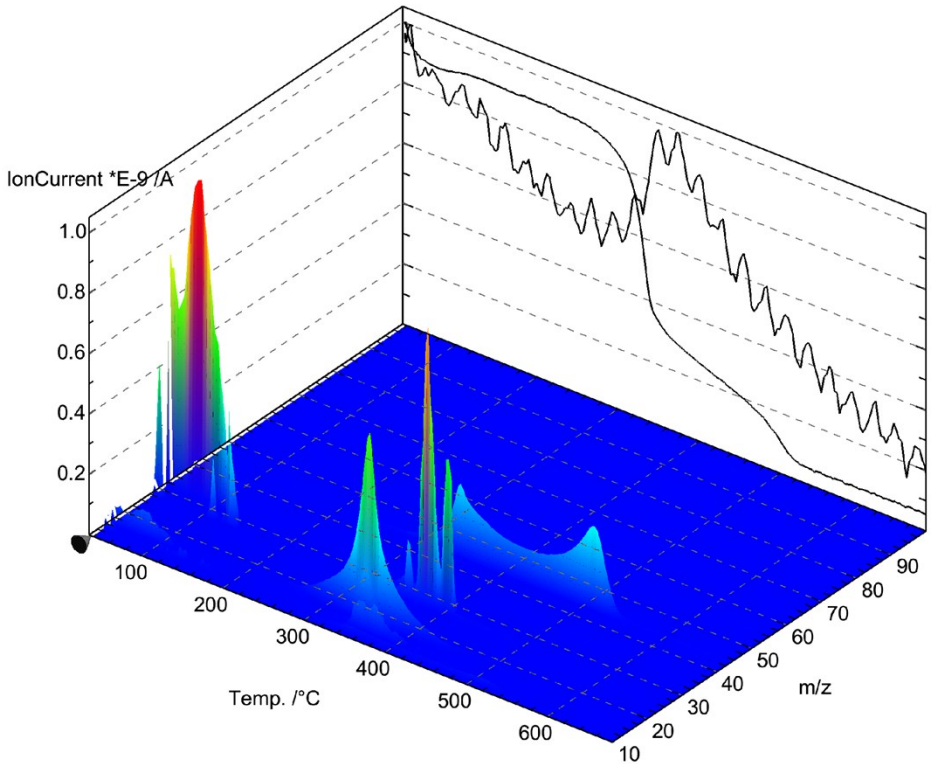

Figure S4. The 3D Mass Spectra of the evolved gas, derived from thermal decomposition of the fluorinated hydrophobic papers after 24 hrs of treatment (with an m/Z range from 10 to 100) indicating no material was detected with m/Z value > 50.

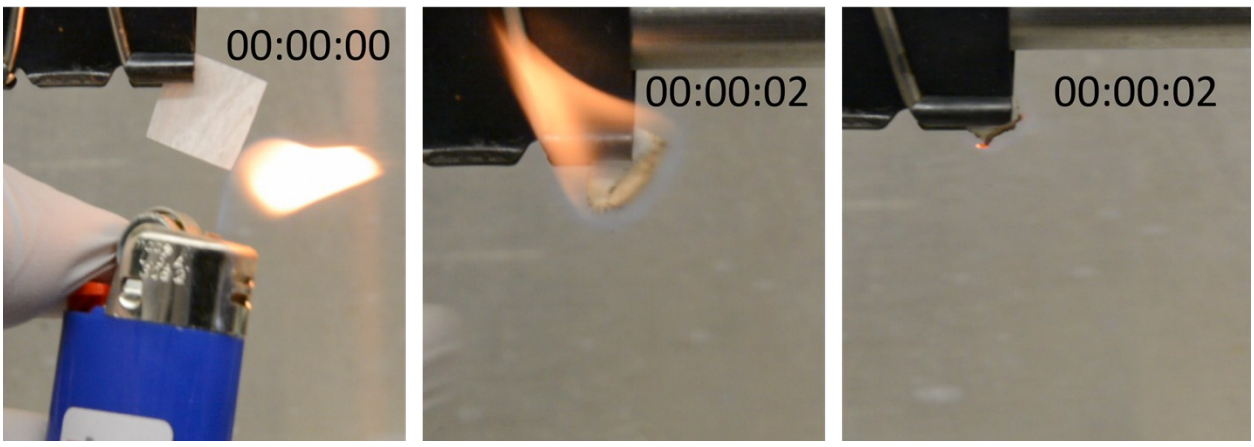

Figure S5. Recordings from burning of 24 h silane treated paper in ambient air. The treated paper rapidly burns compared to the untreated sample of similar dimensions.

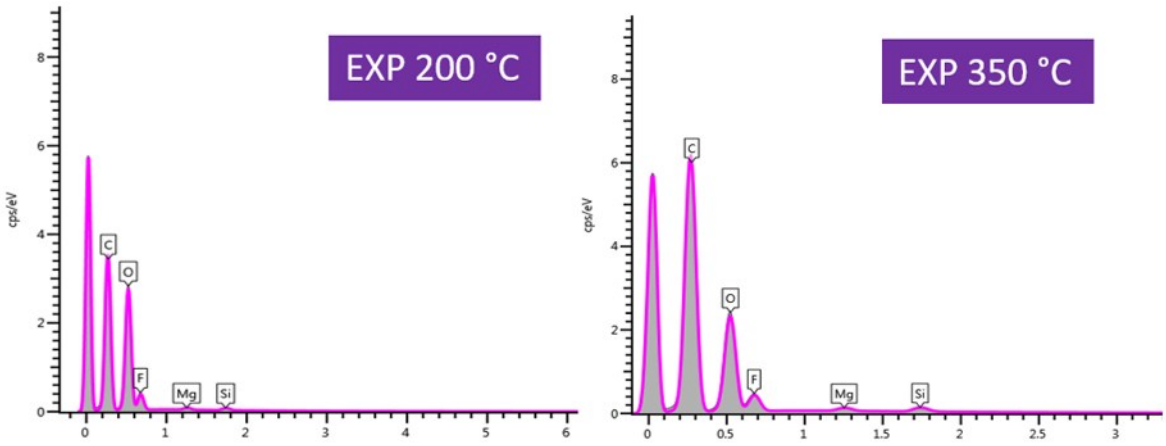

Figure S6. Energy-dispersive X-ray spectroscopy of silanized paper by-products burned at 200°C and 350°C.

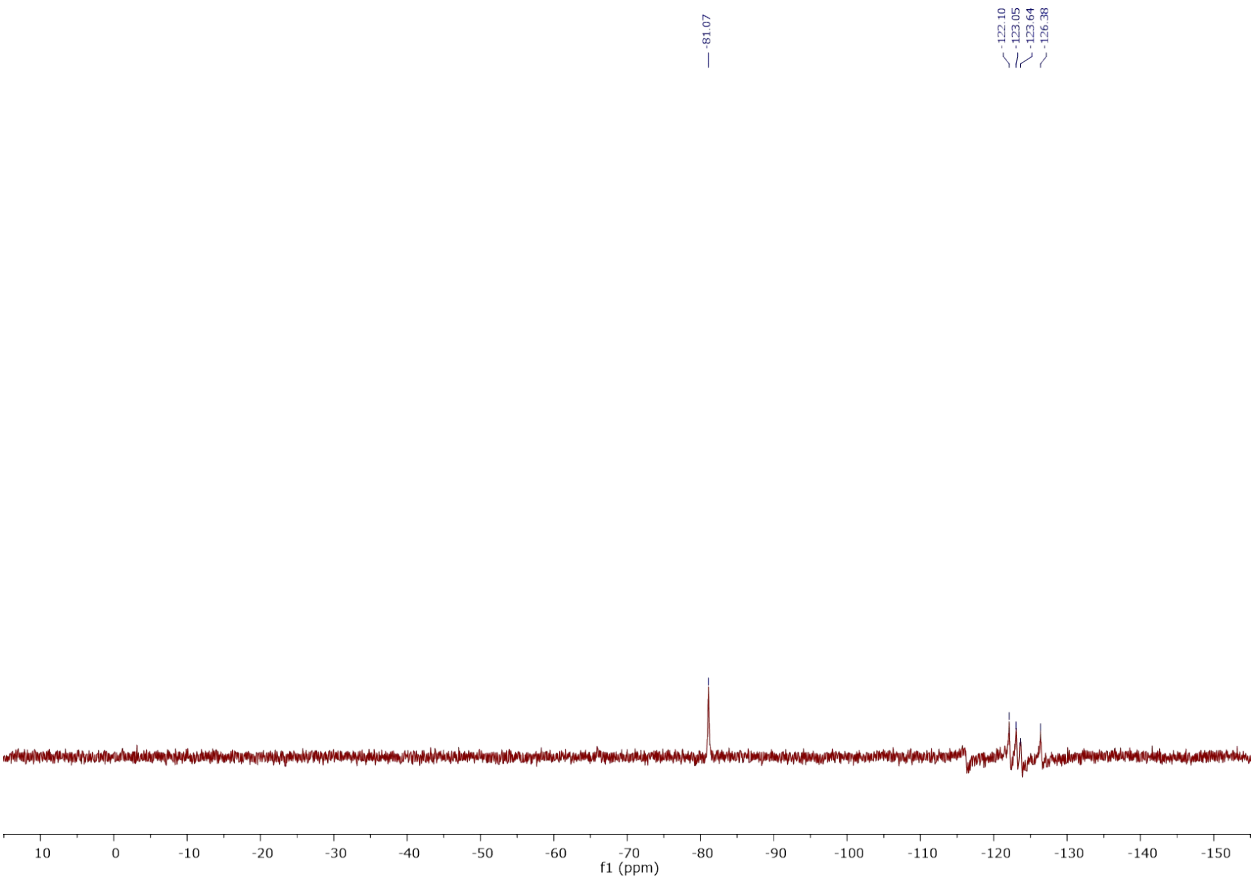

Figure S7. F^{19} NMR of the distillate for the degradation of functionalized paper. Peak at -80.07 ppm is associated with CF_3 groups as reported by Ahvazi et al. on the F^{19} NMR of fluorinated lignin in $CDCL_3$.[3]

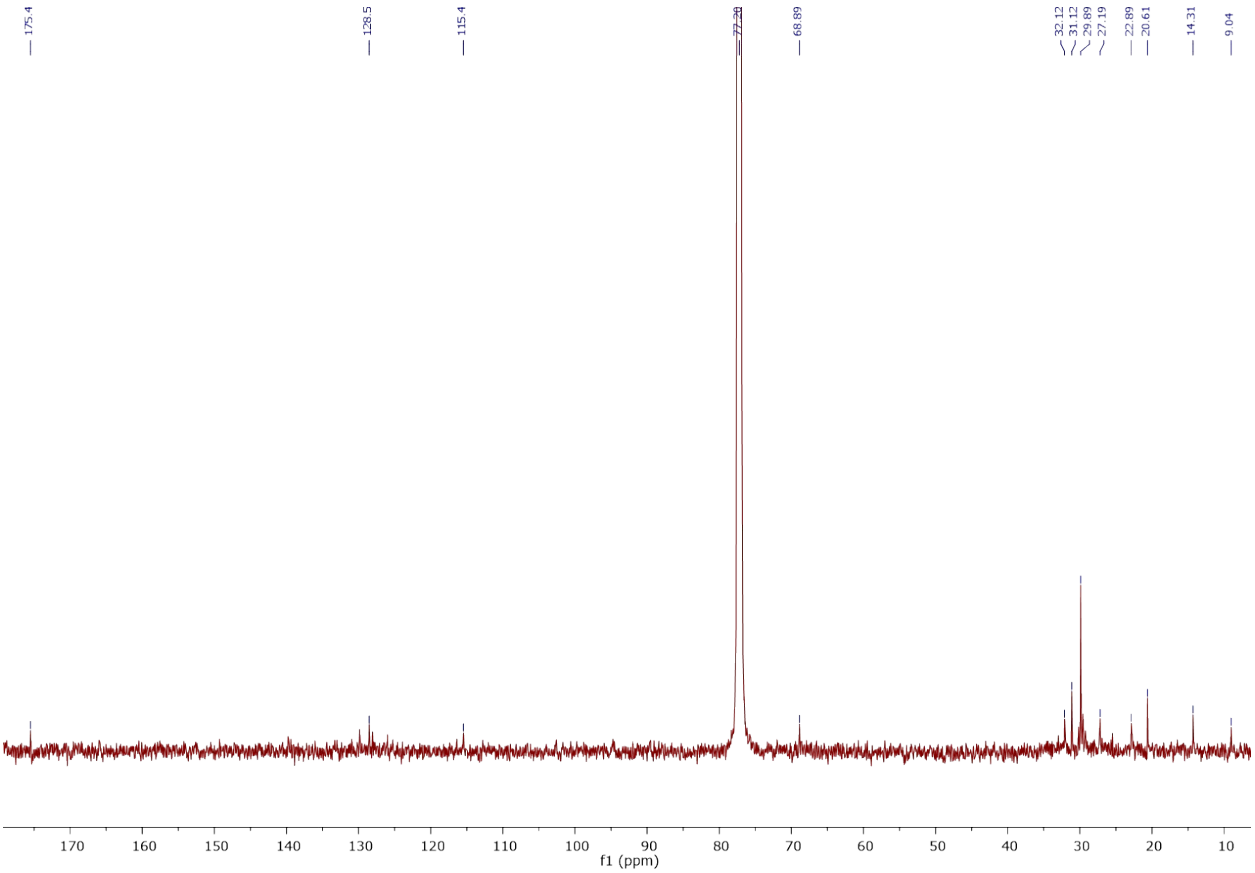

Figure S8. C^{13} NMR of the distillate for the degradation of functionalized paper.

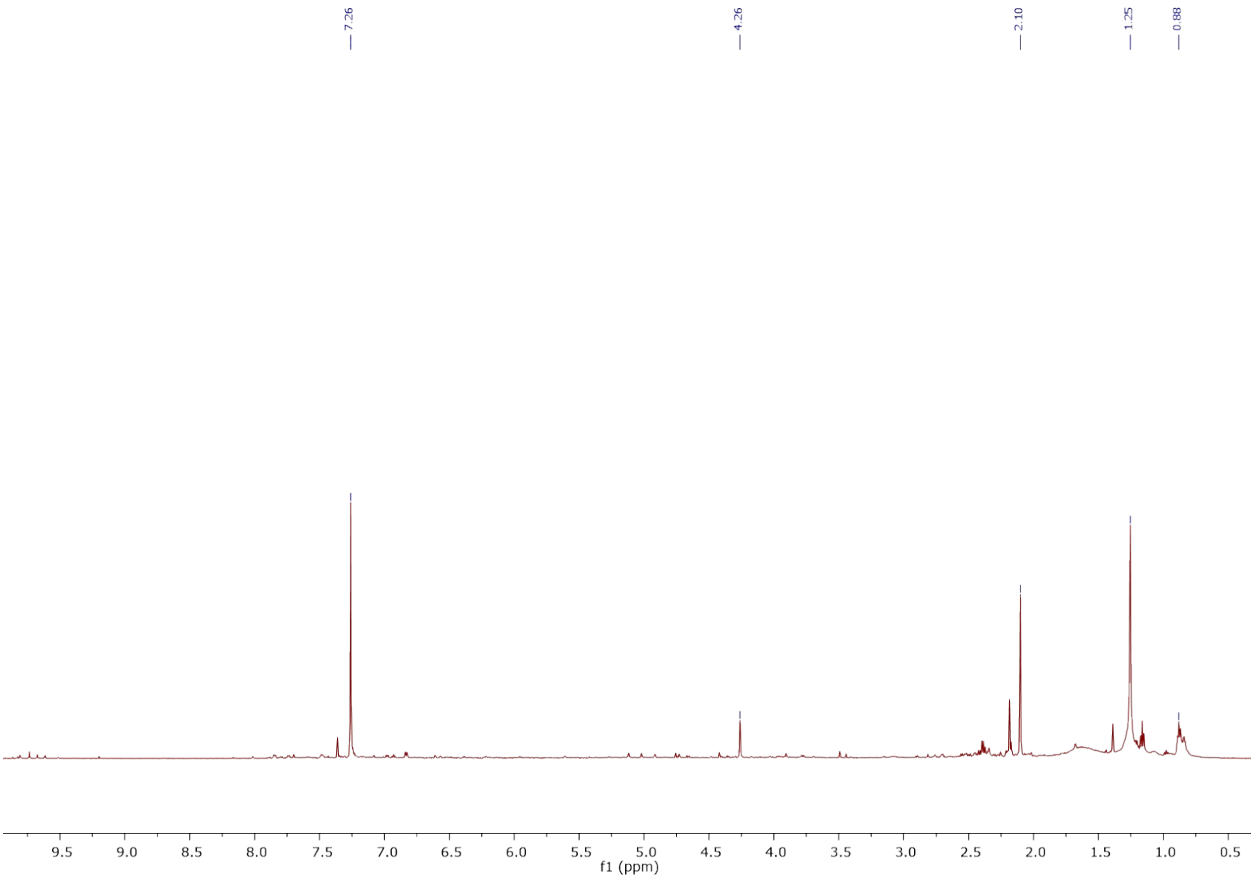

Figure S9. H^1 NMR of the distillate for the degradation of functionalized paper.

REFERENCE

Uncategorized References

1. Mandal, S.; Das, G.; Dhar, S.; Tomy, R. M.; Mukhopadhyay, S.; Banerjee, C.; Barua, A. K., Development of a novel fluorinated n-nc-SiO:H material for solar cell application. *Materials Chemistry and Physics* **2015,** *157*, 130-137.
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