



Mechanochemical Approach to Static Electrification of Common Polymers

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The (chemical) mechanism of static electricity generation on common polymers is not entirely discovered. However, the static charge generation is a significant contributor to friction and energy losses [1], and causes problems in many industries. For the generation of charges, at the molecular level, different mechanisms are proposed so far, such as the electron or ion transfer mechanisms. Here I will present the mechanochemical mechanism of static charge generation, which has recently gained attention. This mechanism starts with the bond-breaking in common polymers upon mechanical input, e.g., touching or rubbing. The formed species, mechanoions and mechanoradicals, can be imaged by various modalities of AFM. [2] [3] Their interaction, which stabilizes the charges (mechanoions) on the surfaces, can be broken by chemically removing the mechanoradicals by the doped radical scavengers. This way, the charges are destabilized and mitigated. Together with common radical scavengers such as DPPH, a newly introduced and abundant radical scavenger lignin[5] will be presented in the talk. Additionally, light-controlled manipulation of triboelectric charges on common polymers [5], in which the tribocharges are mitigated upon illumination with appropriate wavelengths of light in the presence of a mediator organic dye, will also be presented.

References

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