Referee Report on “Improved Adhesion Strength of Silica Thin Films on Polymer Substrates without an Interlayer Using Remote Atmospheric-Pressure CVD”

The manuscript addresses a practical problem: improving SiO_2 adhesion on polycarbonate (PC) deposited by remote atmospheric-pressure PECVD without relying on an acrylic primer. The authors test two pre-treatments (flame treatment and “silicone baking”) and characterize resulting changes via contact angle/surface free energy, XPS and SEM. Adhesion is reported using an abrasion test and a “critical peel load”. The reported gains without primer are moderate and remain far below the primer reference.

The work is potentially useful, but key reporting gaps and one internal inconsistency prevent a reliable assessment.

Required revisions

1. The manuscript refers to “abrasion tests” and a “critical peel load”, but does not provide enough detail on the test setup (geometry, loading rate/conditions, failure criterion, and any standard/protocol). As written, another lab cannot reproduce the measurement or compare it to the literature.
2. The SiO_2 thickness differs substantially between conditions (e.g., ~187 nm untreated; ~223–235 nm for flame-treated; ~57 nm in the primer case). Because thickness/residual stress can strongly affect cracking and apparent adhesion, the study should either control thickness across conditions or explicitly analyze/discuss how thickness may influence the reported adhesion values.
3. The tables report “Average” and “Div”, but the number of replicates (n) is not stated, and “Div” is not defined. Please report n clearly, define the statistical metric used, and add error bars where appropriate.
4. Table 1 reports an adhesion of 229.4 mN for “With primer”, while the text in the adhesion section states the primer-coated substrate shows a maximum adhesion of 150 mN (Figure 5). These values should be reconciled explicitly (different test conditions/sample sets, or a table/figure/text error).
5. Only polycarbonate (2 mm) is studied. Either narrow the title/claims accordingly or include at least one additional polymer substrate to justify “polymer substrates” in general.

Recommended revisions

6. Reporting adhesion only in mN is hard to interpret without normalization (e.g., per width/contact area) or a clearer link to common peel/fracture metrics and application requirements.
7. The “silicone baking” mechanism is plausible, but the interface chemistry remains somewhat inferential. Additional interface-sensitive evidence (e.g., high-resolution XPS analysis, depth profiling, complementary chemistry/roughness measurements) would strengthen the mechanistic argument.
8. Please define “silicone-containing gas” more clearly (identity/composition) and clarify whether any surface residues or conditioning/cleaning steps are expected.