How can Sam's Modify Interfaces and Tune the Electrical Properties of OFET?

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The interest in organic field-effect transistors has steadily grown over the past fifteen years thanks to the possibility to produce large area circuits on flexible substrates and to the addressing of the active elements of displays. Among the key issues that must be resolved to achieve the integration of organic transistors into practical circuits, the crucial role of interfaces appears in the forefront. The modification of surfaces /interfaces can be easily performed by self-assembled monolayers (Sam's) in order to improve electrical performance, in two ways: i) enhance charge injection and retrieval at the source and drain electrodes via dipolar monolayers ii) controlling the semi-conductor-insulator interface, the growth and mobility of the semi-conducting film.
We address here some examples of modification of both the metal electrode (Au, Cu...) by dipolar thiols and the alumina insulator by carboxylic acid .
Several origins that have been potentially identified for the improvement or change of the performance of organic transistors treated with appropriate monolayers or Sam's, will be presented . The first one is general and concerns the structural and crystalline modification of the semi-conducting film (pentacene) grown on the metal or on the oxide . The second relates to the creation of an electrical through charges or the organization of present dipoles.
Experimental data based on interface and semi-conductor characterizations and discussion will be presented ; we discuss the relevant factors of the electrical improvements, related to interfaces and to the film organization at different scales

References

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