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Enabling metal halide perovskites optoelectronics through environmental stability improvement and suppression of toxicity concerns

Teresa Gatti
Center for Materials Research, Justus Liebig University Giessen, Germany

The race for the development of a future generation of low-cost optoelectronic devices, such as solar cells, light-emitting diodes, photodetectors and others, continuously takes on added momentum with the appearance of novel practical solutions for the synthesis and processing of metal halide perovskites,[1] paradigm material platforms for ultra-cheap light-to-electricity and electricity-to-light conversion. Much has been done in the last few years towards defining standard protocols for the assessment of their efficiency and stability, aiming at achieving a worldwide consensus on the issue, that will allow reliable reporting of new data. On the other hand, many efforts are currently addressed at eliminating any concern on their potential toxicity, related to the presence of lead in the most performant formulations.

In this talk, I will illustrate my recent contributions attempting to solve both the stability and toxicity issues of metal halide perovskites, discussing aspects related to the optimization of the hole transporting material (HTM) in perovskite-based solar cells [2,3,4] and on the development of novel bismuth-based halide perovskites,[5,6,7,8] characterized by lower performance compared to the lead-based analogous but at the same time by better stability and minor toxicity concerns.

References

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Prof.ssa Silvia Gross

Il Direttore
Prof. Michele Maggini