Photoelectrolysis of H2O: New insights into an old problem?

One of the most demanding areas of integration of energy technologies is related to the production and use of fuels from regenerative primary energy sources. Direct H_2 formation by **photocatalytic or photoelectrochemical H_2O splitting** provides theoretically the highest light (photon) to fuel efficiency. Advanced materials and design concepts are based on bandgap modified and defect engineered oxides, for which the obtained conversion efficiencies are limited by low mobilites and/or problems to achieve a vectorial charge carrier motion and electron transfer. To our opinion the use of p-doped wide bandgap semiconductors i.e. ZnSe, GaInN, SiC seem to more promising. H2 evolution is possible as photoelectrochemical reaction using nanosized metal catalysts. The O2 evolution as back reaction will be performed on RuO2 or IrO2 electrocatalysts. Materials and devices of this type can be designed, grown, processed and characterized based on complementary expertise to be used for thin thin tandem cells.