In total, 12 H2 molecules can be obtained per mole of glucose, based on the overall number of electrons that can be generated in the complete oxidation of the latter. However, dark fermentation is limited to a maximum H2-production efficiency of 33%, i.e., maximally four molecules of H2 can be acquired per molecule of glucose with acetate and CO2 as the other fermentation end products [9]. Yet, this is only possible when the H2 partial pressure (PH2) is kept adequately low [10], e.g. by continuous stripping of the produced H2 with an inert gas. However, for a cost-effective dark fermentation process it is vital to obtain significantly high H2 yields at relatively elevated PH2, due to the high impact of central costs of feedstock and gas upgrading [11]. Generally, mesophilic (co-)cultures reach H2 yields of ≤ 2 moles/mol hexose [12], thus exemplifying conversion efficiencies of merely 17%. In addition, these yields are obtained at low PH2 only [6]. On the other hand, based on thermodynamic aspects, thermophilic bacteria and archaea may produce up to the theoretical maximum of 4 mol H2/mol hexose [13]. In general, the low H2 yields obtained in practice by different organisms, in addition to the requirement for low PH2, are major obstacles that need to be overcome before biohydrogen production can be industrially feasible [6].