NanoPlatform Embedded Reactions for Enhanced Chemical Transformations (NanoPERfECT)

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A foundational motivation for chemical sensing is that knowledge of the presence and level of a chemical agent can inform a decision about how that agent is to be treated, for example by sequestration, separation or chemical conversion to a less harmful substance. Commonly the sensing and treatment steps are separate. However, the disjoint detection/treatment approach is neither optimal, nor required. Thus, we are investigating how nanostructured architectures can be constructed so that molecular transport (analyte/reagent delivery), chemical sensing (optical or electrochemical) and subsequent treatment can all be coupled in the same physical space during the same translocation event. The last element of this triad, treatment, can be substantially enhanced if mass transport limitations can be overcome. In this context, *in situ* generation of reactive species within confined geometries, such as nanopores or nanochannels is of significant interest, because of its potential utility in overcoming mass transport limitations in chemical reactivity.