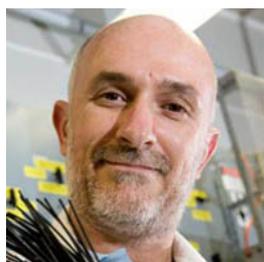


Carbon mixed matrix membranes containing graphene and/or MOFs

Professor **João (Joe) DINIZ DA COSTA**

FIM²Lab – *Functional Interfacial Materials and Membranes Laboratory*
School of Chemical Engineering, The University of Queensland, Brisbane Qld 4072, Australia

Designing mixed matrix structures has many advantages in separation, adsorption and catalytic processes. For instance, building inorganic mixed matrix membranes (MMM) such as carbon and stainless steel hollow fibres conferred superior mechanical properties whilst separating greenhouse gases. Similarly, alumina carbon MMM prepared via a vacuum method conferred the unusual effect of vacuum film etching, thus improving water fluxes in desalination processes. In another example, MMM containing perovskites and catalytic copper phases achieved recently the best ever oxygen fluxes from air separation. Mixed matrix materials have also showed improved performance in catalysis and adsorption. Incorporating graphene oxides into metal oxide catalysts resulted in enhanced kinetic activity related to the degradation of dyes. Of particular importance is the sacrificial role played by graphene oxide in stabilising the active sites of iron oxides in the heterogeneous Fenton-like reaction is discussed. Again, graphene incorporation into an amine functionalised mesoporous silica increased CO₂ sorption capacity, an important technology to abate greenhouse gases. This presentation will cover conceptual ideas and preparation methods together with ensuing discussions on mixed matrix structures.



Biosketch. Joe DA COSTA is an Australian Research Council (ARC) Future Fellow and a Professor in the School of Chemical Engineering at the University of Queensland, Brisbane Australia. He is also the Director of the FIM²Lab – Functional Interfacial Materials and Membranes Laboratory. Joe has 30 years working experience in industrial, consultancy and academic roles in Brazil, England and Australia. Currently, he leads several research projects in the areas of H₂, CO₂, O₂, ethanol separation and desalination using inorganic membranes and membrane reactors, in addition to catalysts for wastewater processing and sorbents for CO₂ capture. Joe has over 250 international publications including 13 book chapters, and he is an editorial board member of Nature's Scientific Report open source journal. His work has been cited over 7000 times, and his H-index is 44. He is a Chartered Professional Engineer in the Colleges of Mechanical Engineering and Chemical Engineering of the Institution of Engineers Australia.
<https://scholar.google.com.au/citations?user=KKNdyzkAAAAJ&hl=en&cstart=40&pagesize=20>