

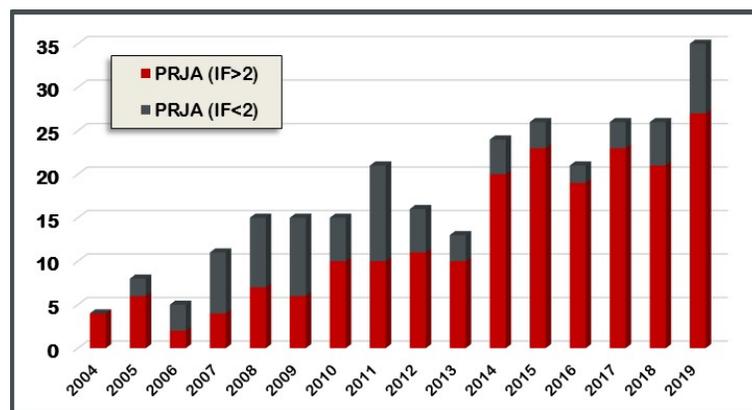
Highlights

Research Outputs



HIGHLIGHT # 9 – RESEARCH OUTPUTS

Publications



The number of peer reviewed journal publications by c*change has steadily increased, and so has the average impact factor, indicating that both the research quantity and quality continues to improve.

c*change has succeeded in publishing in Nature, a sought-after journal with an impact factor of 42.8 (2019).

Fig 1: Peer Reviewed Publications

In addition to the peer reviewed journal publications (203 with IF > 2, 78 with IF < 2), 33 published conference proceedings, 6 books or book chapters, 645 un-published conference proceedings as well as 36 provisional or granted patents have been produced by c*change, hence breaching the 1,000 mark in total.

Over 10% of the publications are joint publications from team members with different university affiliations, indicative of the close connections between projects at the participating institutions and the collaborative nature of the projects within each of the programmes.

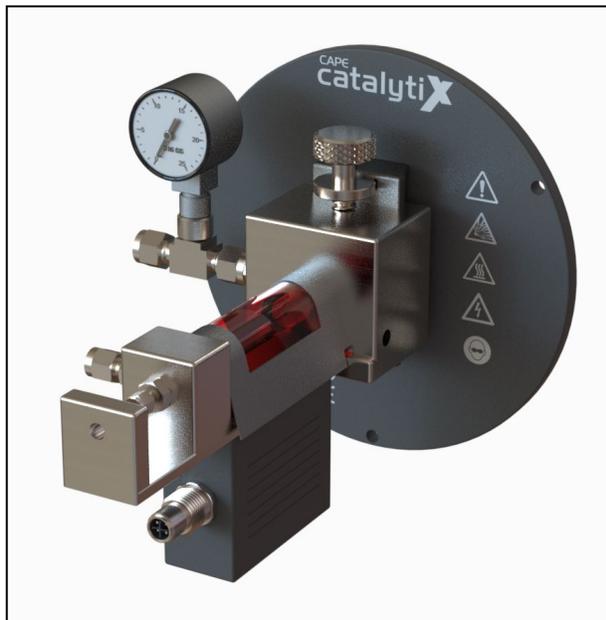
Artwork depicting some of the work has featured on the front or back covers of journals.



Fig 2: Artwork depicting c*change research

The DST – NRF Centre of Excellence in Catalysis seeks to explore a new paradigm for basic science and technology research. In addition to its scientific focus on chemical transformations, the Centre will serve as an agent for change for the development of a new generation of research leaders incorporating the full diversity of South Africa's rich scientific potential. As a virtual centre and network, it will achieve these goals via national research programmes principally of relevance to South Africa and the African Continent.

Products



The *in-situ* X-Ray Reaction Cell was developed to overcome limitations with the then-available laboratory equipment.

The reaction cell is superior in that it allows for catalytic transformations to be studied with conventional XRD machines at industrially relevant conditions, namely temperatures and pressures up to 450°C and 20 bar, whilst also conducting the reaction under continuous water partial pressure flow conditions, crucial in syngas catalysis.

The patents on the *in-situ* X-Ray Reaction Cell have been licensed to Cape Catalytix (Pty) Ltd and this product is now commercially available (cf. Highlight # 6). Units have been sold globally (South Africa, Saudi Arabia, The Netherlands, Canada and China).

Fig 3: In-situ X-Ray Reaction Cell

Processes

This work of c*change aims to support South Africa's global strength in synthetic fuels production as well as in adding value to the chemical product slate.

The Syngas Programme has developed process technologies to increase the content of higher-value nitrogen-containing compounds and alcohols from the Fischer-Tropsch process that is central to South Africa's synthetic fuels production. (cf. Highlight # 1).

The Paraffin Activation Programme has developed process technologies to add value to the chemical product pool during synthetic fuels production by transforming low-value paraffinic compounds to higher-value oxygen-containing compounds (cf. Highlight # 2).

The RSA Olefins Programme has developed process technologies to add value to the chemical product pool during synthetic fuels production by transforming poorly marketable 'odd-numbered' carbon chain compounds to 'even-numbered' carbon chain compounds that are more marketable globally, in particular in the detergent markets (cf. Highlight #3).

Services

The primary service that c*change has been involved in has been in the development of schools curriculum teaching materials and content, producing some 6,000 copies of a Chemical Industries Resource Pack that has been distributed to schools nationally, and hosting some 60 teachers' workshops to train about 2,000 teachers in the material's usage. This roll-out is being followed up by the development of a Practical Resource Pack to demonstrate theoretically taught course content of the physical sciences (cf. Highlight # 5).