

FuturePHARMA Small Molecule Facility

The FuturePHARMA Small Molecule Facility (SMF), hosted by the CSIR, is a national pilot-scale facility dedicated to developing and producing small-molecule active pharmaceutical ingredients (APIs), which are chemically synthesised compounds that provide the therapeutic effect in most medicines.

The facility addresses a critical gap between laboratory research and industrial manufacturing by translating laboratory-developed API processes into efficient, scalable continuous-flow processes and demonstrating them at kilogram to multi-kilogram scale. This reduces technical and scale-up risks and enables proven processes to be transferred to local manufacturers for commercial production.

As the anchor infrastructure of the Department of Science, Technology and Innovation (DSTI) and the Technology Innovation Agency's (TIA) API Innovation Cluster (APIIC), implemented in partnership with Chemical Process Technologies Pharma and university partners across South Africa, the SMF operates on an innovate-to-manufacture model. The CSIR develops, optimises and scales the chemistry, while industry partners take validated processes into commercial manufacture. This approach strengthens South Africa's capacity to develop locally owned manufacturing routes for priority medicines while contributing to a more resilient pharmaceutical manufacturing ecosystem across Africa.



The need for this capability is significant. Africa remains highly dependent on imported medicines and pharmaceutical inputs, while South Africa imports approximately 98% of its APIs, predominantly from India and China. This exposure creates vulnerabilities to global price fluctuations, export restrictions, geopolitical disruptions and supply-chain shocks.

The SMF addresses this strategic vulnerability by developing cost-competitive local API manufacturing routes, demonstrating them at pilot scale and enabling technology transfer to South African manufacturers. In doing so, it supports stronger local pharmaceutical value chains and creates opportunities to supply South African and regional markets under the African Continental Free Trade Area.

The SMF is distinguished by its continuous-flow manufacturing platform, in which reagents are continuously processed through compact, precisely controlled reactors. Compared with conventional batch manufacturing, this technology can enable faster reactions, improved yields, reduced waste and more

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efficient use of solvents and energy. Small reactor volumes can improve the safe handling of hazardous or highly energetic chemistry, while modular and reconfigurable systems provide flexibility to manufacture different APIs. Scale-up can be achieved through extended operation or parallelisation, while steady-state processing, in-line monitoring and quality-by-design principles support consistent product quality.

Beyond API production, the SMF is designed to generate broader industrial, economic and skills-development impact. It can stimulate demand for local fine chemicals, starting materials, engineering services and contract development and manufacturing capabilities; create opportunities for technology commercialisation and investment; and develop specialised expertise in flow chemistry, process development and pharmaceutical quality systems. Through collaboration with universities and industry, the facility can contribute to developing the scientific and engineering workforce required to support a competitive local API industry.

The SMF provides opportunities for industry, research institutions, funders and development partners to engage through contract process development, pilot-scale demonstration, technology transfer and licensing, contract development and manufacturing, collaborative research, investment and co-investment, and skills-development partnerships. Opportunities include supporting the facility's future Current Good Manufacturing Practice expansion, developing priority API pipelines and transferring de-risked technologies into commercial manufacturing.

The FuturePHARMA Small Molecule Facility is a strategic platform for moving Africa from dependence on imported pharmaceutical ingredients towards greater local capability — translating scientific innovation into

manufacturing capacity, strengthening pharmaceutical value chains and supporting long-term health security.



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