

# Homegrown compound to boost local cosmetic and personal care industry

## The production of kojic acid and chloro-kojic acid derivative using an *Aspergillus oryzae* fungal strain

A compound with an unconventional start as a waste by-product of one project, is expected to turn into a technological winner that opens the local market for the cost-effective production of international calibre kojic acid, offering a high quality product that is stable and suitable for local dermatology and cosmetic markets, and an easily up-scalable manufacturing process to be licensed to an African female-led SMME.

### Thumbs up to the Kojic acid project for:

- Establishing the CSIR as local manufacturer of kojic acid, replacing imports and increasing economic competitiveness.
- Direct and indirect job creation.
- Improving infrastructure and demonstration of the CSIR's capability to produce high efficacy kojic acid products.
- Contributing to skills development.

The CSIR has identified localised kojic acid manufacturing as an ideal starting point to enter the organic skin care market while also promoting the growth of SMMEs in the South African cosmetic sector.

Kojic acid is a natural metabolite produced by fungi that has the ability to inhibit the production of melanin. This is good news for people with skin colour disorders such as those caused by excessive exposure to sunlight, aging, hormonal imbalances, or some medications, among others. Kojic acid can act as an ultra violet protector, and can suppress hyperpigmentation and restrain melanin from forming.

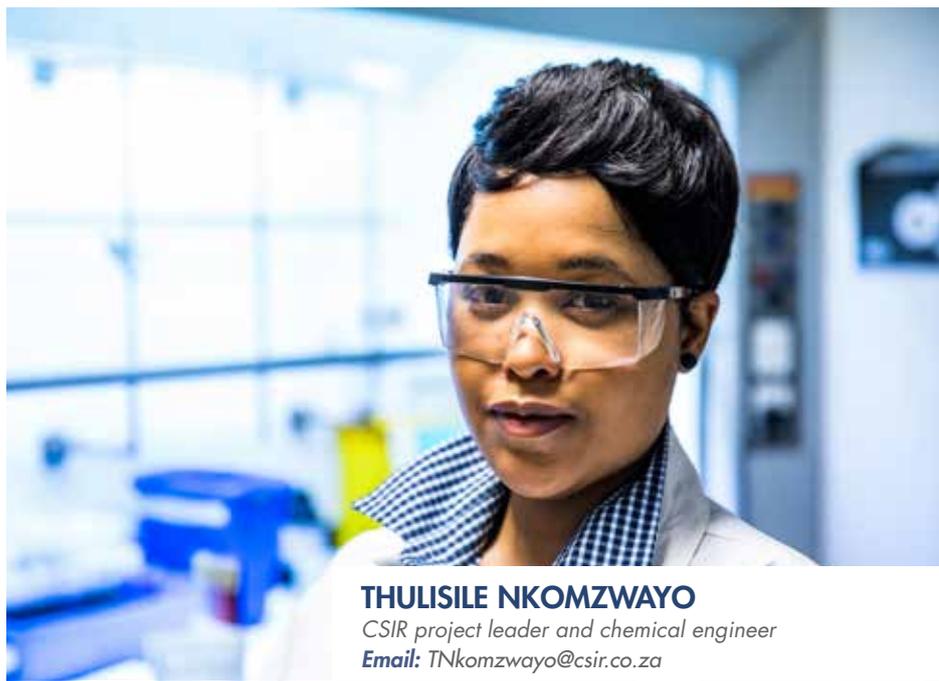
Other star qualities of this compound, which is currently only available from international suppliers, include being biocompatible, antimicrobial and antiviral, anti-inflammatory, antidiabetic, anticancer, antiparasitic as well as offering pesticidal and insecticidal properties. It is used in skin creams, lotions, soaps and dental care products. The nano-carrier system prepared from kojic acid shows effective deliveries of anti-

cancer drugs, significantly inhibits cell proliferation and also reduces tumour growth. Thus, apart from its benefits to the cosmetic and personal care industry and the agricultural and food industry, kojic acid's vast biological activities provide an excellent structure in medicinal chemistry research.

Kojic acid has been proven to be a natural metabolite that is produced in large quantities as a by-product of fungal growth; as such, there is no need to invest in cultivating, producing or extracting the compound, resulting in production cost benefits.

The demand of the compound is also set to increase as global cosmetic manufacturers are seeking replacements for hydroquinone, a skin-lightening ingredient banned by the United States Food and Drug Administration in 2006.

Currently at a technology readiness level of between four and five, the CSIR envisages that the product will be a local replacement of imported kojic acid, benefiting from an optimised manufacturing process and yielding similar or higher product purity and



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quality with a reduced delivery time. This organic acid produced using CSIR extraction processes has been shown to be at 97% purity using nuclear magnetic resonance. Scientists developed the product purification method using reverse-phase with higher efficacy and product recovery than the recrystallisation method currently used industrially.

The raw ingredient will now be applied in cosmetic formulations to validate dermal safety and efficacy. The product or prototype will then be offered to dermatologists or suppliers of cosmetic products for uptake to replace imports and support locally produced cosmetic products.

CSIR project leader and chemical engineer Thulisile Nkomzwayo is passionate about process design and optimisation. This research, she believes, will touch lives through innovation by introducing world-class locally produced alternatives, and supporting SMMEs in the cost-effective manufacturing of niche dermatological ingredients. She says, "Because the CSIR is the incubator of the optimised process, the transfer of the technology to an SMME means the enterprise would not have to grapple with the high investment cost that comes with initial start-up research and development."



An agar plate with the fungal strain used to synthesise kojic acid.