

macrofarm

SPIN  FF >

 UNIVERSITÀ DELLA CALABRIA

ALIGNMENT OF THE COMPANY MISSION  
WITH THE CUSTOMER NEEDS!



**chi siamo**





# chi siamo

---

Macrofarm srl è uno spin-off dell'Università della Calabria che nasce nel 2010 in seguito alla volontà di voler trasferire nel mondo industriale le competenze acquisite, in anni di esperienza accademica, da alcuni docenti e ricercatori del Dipartimento di Farmacia e SNN dell'Università della Calabria. Il team Macrofarm presenta competenze in diversi ambiti scientifici e professionali e rappresenta il vero punto di forza dell'azienda.

**Dott. Fabio Amone**

CEO e Direttore Commerciale

**Prof. Francesco Puoci**

Co-Founder e Advisor Board  
Prof. Ordinario di tecnologia  
Farmaceutica - Unical

**Prof. Vincenzo Pezzi**

Co-Founder  
Prof. Ordinario di Biologia  
Cellulare - Unical

**Dott.ssa Ortensia Ilaria Parisi**

Co-Founder Direttrice Tecnica

**Dott. Rocco Malivindi**

Responsabile Laboratorio  
Biologico

**Dott.ssa Anna Vattimo**

Responsabile Ricerca e  
Sviluppo e Affari Regolatori

**Dott.ssa Angela Crusco**

Responsabile produzione

**Dott.ssa Carina Minervini**

Graphic Designer



*cosa facciamo*

# cosa facciamo

---



Il campo di attività che da sempre ha caratterizzato l'azienda è rappresentato dall'elaborazione di tecnologie d'avanguardia per l'ottenimento di coniugati polimerici e in generale prodotti funzionali, utilizzabili in campo cosmetico, nutraceutico e farmaceutico.

Nel tempo, Macrofarm si è proposta alle varie aziende del settore come "connessione" tra la ricerca e l'industria offrendo un vantaggio reale nello sviluppo di nuove materie prime e prototipazioni di cosmetici, nutraceutici e medical device.

Ad oggi, Macrofarm è fornitore di bioattivi polimerici e di estratti vegetali qualitativamente superiori che possono essere utilizzati come ingredienti attivi in formulazioni cosmetiche.

La nostra azienda offre, inoltre, una serie di test a supporto dell'efficacia e della sicurezza delle materie prime sviluppate.

A close-up photograph of several glass petri dishes arranged on a light surface. Each dish contains a clear, light blue liquid. A pipette tip is visible on the right side, positioned over one of the dishes. The lighting creates soft shadows and highlights the edges of the dishes.

# **ricerca e sviluppo**



Macrofarm svolge le seguenti attività

- Ricerca, sviluppo e produzione di materie prime innovative ad alto contenuto di principi attivi, utilizzabili in campo cosmetico e nutraceutico.
- Ricerca, sviluppo e produzione di nuove formulazioni cosmetiche.
- Ricerca, sviluppo e prototipazione di nuove formulazioni nutraceutiche e dispositivi medici.
- Ricerca e sviluppo in campo farmaceutico
- Supporto alle aziende in percorsi di sviluppo e valorizzazione di prodotti innovativi mediante presentazione di brevetti, registrazione di marchi e pubblicazioni scientifiche.



**tailor made**



Il **Laboratorio di Ricerca e Sviluppo di Macrofarm s.r.l.** offre inoltre un servizio di eccellenza nel campo della produzione di nuove **Functional Raw Materials**, focalizzato sulle esigenze dei clienti e nel pieno rispetto degli standard qualitativi.

Disporre di un ingrediente cosmetico unico, formulato in **tailor-made**, rappresenta infatti un chiaro vantaggio competitivo per le aziende che puntano sullo sviluppo di nuovi prodotti.

Il nostro personale specializzato si occuperà quindi di creare un **progetto di sviluppo personalizzato**, controllando puntualmente tutte le fasi di processo, puntando a soddisfare tre aspetti fondamentali per la nostra azienda:

- **qualità:** attraverso lo sviluppo di nuovi ingredienti o nuove

tecnologie capaci di soddisfare al meglio il cliente;

- **sicurezza:** mediante continui investimenti finalizzati a migliorare la sicurezza dei prodotti;
- **efficacia:** attraverso una costante ricerca formulativa, al fine di sviluppare ingredienti con efficacia dimostrata mediante test in vitro e in vivo per il supporto dei claims attribuiti.

Avvalendosi delle conoscenze e competenze acquisite in anni di esperienza, il nostro team di esperti accompagna il cliente passo dopo passo dall'idea iniziale fino alla realizzazione di una **nuova materia prima**.



Il nostro personale si occuperà quindi di tutte le fasi di processo:



**FASE 1**  
Ricerca bibliografica



**FASE 2**  
Proposta Inci



**FASE 3**  
Sviluppo prototipi e lotto pilota



**FASE 4**  
Verifica dei parametri chimico-fisici



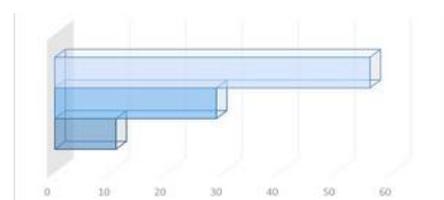
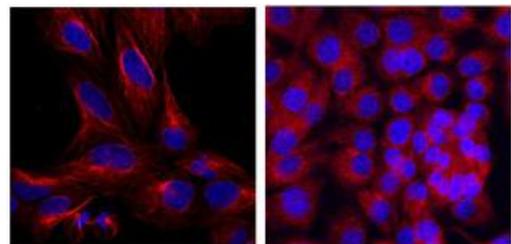
**FASE 5**  
Redazione TDS, SDS e materiale informativo



**FASE 6**  
Produzione della nuova materia prima

Opzionali:

- **test di efficacia a supporto dei claims**
- **sviluppo di razionali scientifici relativi ai prodotti e alle tecnologie sviluppate**
- **supporto alle aziende che desiderano valorizzare la realizzazione materie prime innovative mediante il deposito di brevetti, registrazione di marchi e pubblicazioni scientifiche.**





Ad oggi l'attività di ricerca, sviluppo e prototipazione ci ha permesso di realizzare soluzioni cosmetiche, farmaceutiche e nutraceutiche di elevato standard qualitativo, focalizzate sulle esigenze dei nostri clienti, portando alla realizzazione di **pubblicazioni scientifiche** e al **deposito di nuovi brevetti**.

Tali attività possono essere rendicontate per ottenere crediti d'imposta per progetti di Ricerca e Sviluppo.

Research Article  
Received: 18 February 2018; Revised: 22 May 2018; Accepted: 27 May 2018; Published online in Wiley Online Library: 21 June 2018  
(wileyonlinelibrary.com) DOI: 10.1002/polb.1499

## Antioxidant and spectroscopic studies of crosslinked polymers synthesized by grafting polymerization of ferulic acid

Ortensia Ilaria Parisi<sup>1</sup>, Francesco Pucci<sup>1\*</sup>, Francesca Iemma<sup>1</sup>, Giuseppina De Luca<sup>2</sup>, Manuela Curcio<sup>3</sup>, Giuseppe Cirillo<sup>3</sup>, Umile Gianfranco Spizzirri<sup>3</sup> and Nevio Picci<sup>3</sup>

A novel, simple synthetic strategy for the preparation of crosslinked polymers with significant antioxidant properties is proposed. Ferulic acid (FA), a well-known antioxidant compound, due to its reactivity toward free radical species, was inserted into a polymeric network with methacrylic acid (MAA) and ethylene glycole dimethacrylate acting as comonomer and crosslinker, respectively. All the reactants were simultaneously mixed in the polymerization feed and one-pot radical reaction was carried out. Irregular microparticles were prepared by bulk polymerization and microspheres by precipitation polymerization. The materials were characterized by nuclear magnetic resonance-magic angle spinning (NMR-MAS) studies, to verify effective FA insertion into polymeric networks, and by morphological, dimensional analysis, and water absorption measurement to study their superficial and swelling properties, respectively. Antioxidant properties of materials were evaluated by nitric acid emulsion system-thiocyanate assay, determination of scavenging activity on DPPH radicals, determination of available phenolic groups in polymeric matrices, and determination of total antioxidant capacity. Copyright © 2018 John Wiley & Sons, Ltd.



Article

## Interconnected PolymerS TeChnology (IPSTIC): An Effective Approach for the Modulation of 5α-Reductase Activity in Hair Loss Conditions

Ortensia Ilaria Parisi<sup>1,2</sup>, Luca Scifano<sup>1</sup>, Fabio Amorè<sup>2</sup>, Rocco Malivindi<sup>1,2</sup> and Francesco Pucci<sup>1,3\*</sup>

<sup>1</sup> Department of Pharmacy, Health and Nutritional Sciences, University of Calabria, IRTM Rende (CS), Italy; ortensia.ilaria@unical.it (O.I.P.); luca.scifano@unical.it (L.S.); rocco.malivindi@unical.it (R.M.); francesco.pucci@unical.it (F.P.)  
<sup>2</sup> Macrofarm s.r.l., c/o Department of Pharmacy, Health and Nutritional Sciences, University of Calabria, IRTM Rende (CS), Italy; amorofabio@gmail.com (F.A.); scifanoluca@phs.unical.it (L.S.)  
\* Correspondence: francesco.pucci@unical.it; Tel.: +390984490351

Received: 16 April 2018; Accepted: 07 July 2018; Published: 12 July 2018

**Abstract:** Hair loss represents a condition that adversely affects the social life of patients. The most common cause is androgenetic alopecia (AGA), which is a genetically determined progressive hair-loss condition involving 5α-reductase. In this study, a novel anti-baldness agent based on Interconnected PolymerS TeChnology (IPSTIC), which is an effective strategy for the delivery of bioactive molecules, was developed. This product (IPSTIC, patch hair) is based on a polymeric blend consisting of high molecular weight hyaluronic acid and soybean proteins and is able to improve efficacy and stability of bioactive ingredients such as Origanum vulgare leaf extract, Camellia Sinensis leaf extract, and Capsicum Annuum fruit extract. The efficacy of the developed anti-baldness agent was investigated by performing several tests including NO radical and 5α-reductase inhibition assays, stability studies under different conditions, and in vitro diffusion studies using Franz cells. The biocompatibility of IPSTIC patch hair was also evaluated by in vitro analysis of the pro-sensitizing potential and EPIKIN model. The obtained results confirmed both the efficacy and safety of IPSTIC patch hair supporting the potential use of this product in the topical treatment of AGA.

**Keywords:** hair loss; androgenetic alopecia (AGA); 5α-reductase; polymeric blend; hyaluronic acid; soybean proteins; Origanum vulgare leaf extract; Camellia Sinensis leaf extract; Capsicum Annuum fruit extract; EPIKIN model

### 1. Introduction

Hair loss represents a harmful condition that adversely affects the quality of social life of patients. The main causes of hair loss include telogen effluvium, nutrition, endocrine imbalances, drugs, infections, special diseases, malignancy, stress, and environmental factors. In this context, the most common one is represented by androgenetic alopecia (AGA), which is a genetically determined hair-loss hereditary condition affecting a large number of both men and women [1,2]. This pathological condition involves an altered hair cycle with a progressive miniaturization of the hair follicle, which is smaller as a result.

The hair follicle is an epidermal structure, which undergoes repetitive cycles consisting of four main phases such as anagen (active growth), catagen (apoptosis-driven involution), exogen (hair shedding), and telogen (relative quiescence) [3]. AGA is characterized by a gradually decreased anagen phase; on the contrary, the duration of telogen remains unchanged or is protracted. Two main factors are



Published online in Wiley Online Library: 21 June 2018

DOI: 10.1002/polb.1499

Copyright © 2018 John Wiley & Sons, Ltd.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.

This article is a U.S. Government work and, as such, is in the public domain in the United States of America.



macrofarm

SPINOFF >

 UNIVERSITÀ DELLA CALABRIA

**Macrofarm S.r.l.**

Via Pietro Bucci, Università della Calabria

87036 - Rende (CS)

P.I. IT03100950785

+39 0984 493 151

+39 349 759 2449

[info@macrofarmsrl.com](mailto:info@macrofarmsrl.com)

[www.macrofarmsrl.com](http://www.macrofarmsrl.com)