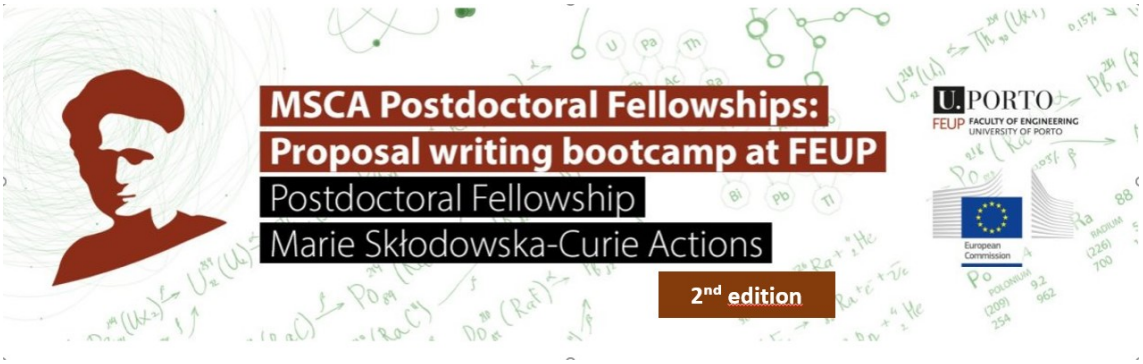

SUPERVISOR INFORMATION	
First and Last name	Maria Ascensão Lopes
URL of supervisor webpage	CV FEUP
Department	Department of Mechanical Engineering
Field(s) of research	Medical devices
PROJECT PROPOSAL	
Title (optional)	Far infrared (FIR) irradiation-based medical devices to treat musculoskeletal diseases

Brief project description

The ageing population associated with the increase in obesity and sedentary lifestyles are all factors that have contributed significantly to the high incidence of musculoskeletal diseases. The medical devices available for bone, muscle and tendon repair are inadequate to promote a fast recovery as needed in this target population.

Far infrared energy (FIR) has the longest wavelength in the infrared spectrum allowing it to penetrate the body most deeply, affecting soft tissue and the cellular activity of those tissues. FIR therapy has shown the ability to enhance blood circulation, reduce oxidative stress, stimulate cellular proliferation, and encourage angiogenesis, thus making it a valuable tool in regenerative medicine and physical therapy [1]. FIR therapy is already used to reduce pain in specific disorders, such as osteoarthritis, fibromyalgia and chronic myofascial pain. It appears to be a safe and effective complementary therapy [2]. More recently, some *in vitro* and *in vivo* studies have demonstrated promising results in the treatment of wound healing [3].

This project aims to develop innovative materials to produce new medical devices that potentiate fast specific tissue regeneration by far infrared irradiation.

References:

[1] Carrick FR, Valerio LSA, Gonzalez-Vega MN, Engel D, Sugaya K. Accelerated Wound Healing Using a Novel Far-Infrared Ceramic Blanket. Life. 2021; 11(9):878. https://doi.org/10.3390/life11090878.

[2] Tsagkaris C, Papazoglou AS, Eleftheriades A, Tsakopoulos S, Alexiou A, Găman MA, Moysidis DV. Infrared Radiation in the Management of Musculoskeletal Conditions and Chronic Pain: A Systematic Review. Eur J Investig Health Psychol Educ. 2022 Mar 14;12(3):334-343. https://doi.org/10.3390/ejihpe12030024.

[3] Carrick FR, Valerio LSA, Gonzalez-Vega MN, Engel D, Sugaya K. Accelerated Wound Healing Using a Novel Far-Infrared Ceramic Blanket. Life. 2021; 11(9):878. https://doi.org/10.3390/life11090878.