UNIVERSITE ABDELMALEK ESSAADI
FACULTE DES SCIENCES
TETOUAN

CENTRE D'ETUDES DOCTORALES
SCIENCES ET TECHNOLOGIES
TETOUAN

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AVIS DE SOUTENANCE DE THESE

En vue de l'obtention du DOCTORAT en SCIENCES

Le Doyen de la Faculté des Sciences de Tétouan annonce que

Monsieur Mustapha Bajtaoui soutiendra une thèse intitulée :

Design and Fabrication of Rectennas for Energy Harvesting and Wireless Power Transfer

Discipline : Physique
Spécialité : Electronique et Télécommunications
À
La salle des soutenances, Faculté des Sciences de Tétouan
Le 21 Janvier 2023 à 10h00

Devant le jury composé de:

Pr. Mohsine Khalladi	**FS, UAE, Tétouan, Maroc**	**Président**
Pr. Aghzout Otman	**Établissement, Université**	**Rapporteur**
Pr. Mariem Aznabet	**FS, UAE, Tétouan, Maroc**	**Rapporteur**
Pr. Mohamed Essaaidi	**ENSIAS, UMV, Rabat, Maroc**	**Rapporteur**
Pr. Asmaee Zugari	**FS, UAE, Tétouan, Maroc**	**Examinateur**
Pr. Hakim Takhedmit	**Université Paris-Est, île-de-France**	**Examinateur**
Pr. Soufiane El Adraoui	**FS, UAE, Tétouan, Maroc**	**Invité**
Pr. Otman EL Mrabet	**FS, UAE, Tétouan, Maroc**	**Directeur**

Résumé

The main focus of this thesis is to design and fabricate rectennas for energy harvesting and wireless power transfer. First, a novel circularly polarized rectenna, with a harmonic suppression, capable of harvesting low-power RF energy with wide operating output loads is presented. Simulated and measured results show that the rectenna's efficiency is more than 45% at 2.45 GHz with an input power of -15 dBm under different polarizations. Importantly, the measured results show also that the proposed configuration can maintain the same efficiency over wide ranges of loads (from 1 to 5 kΩ). The measured output dc voltage of the rectifier with a load resistance of 3-kΩ is 0.21 V and 1.22 V at -15 dBm and 0 dBm, respectively. In the second part of this thesis, a 5 G flexible rectenna working at 3.5 GHz and can be used to power IoT wearable electronic devices for medical applications is developed. The main feature of this design is that the folded antenna is connected directly to the diode which avoids the use of matching network resulting in a compact design with a uniplanar structure. It is easy to fabricate, low cost, and easily connected to the other circuit components.

Mots clés : Energy Harvesting, Wireless Power transfer, Rectennas, Flexible Substrate, 5G, Internet of things (IoT).