LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	A study of line-plane configuration in the Corona discharge theory		
Jumlah Penulis	:	8 orang (Asep Yoyo Wardaya, Zaenul Muhlisin, Alam Hudi, Jatmiko Endro Suseno, Muhammad Nur, Andi Wibowo Kinandana, and **Jaka Windarta**)		
Status Pengusul	:	penulis ke-8		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	The European Physical Journal Applied Physics (EPJ AP)
		b. Nomor ISSN	:	1286-0050
		c. Vol, No., Bln Thn	:	89, 30801 (2020)
		d. Penerbit	:	EDP Sciences
		e. DOI artikel (jika ada)	:	https://doi.org/10.1051/epjap/2020200011
		f. Alamat web jurnal	:	https://epjap.epj.org/articles/epjap/abs/2020/03/ap200011/ap200011.html
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Mochammad Facta, S.T., M.T., Ph.D.
NIP. 197106161999031003
Unit : Teknik Elektro FT UNDIP

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Dr. Wahyudi, ST, MT
NIP. 196906121994031001
Unit : Teknik Elektro FT UNDIP

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d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	12,00			12,00
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2. **Ruang lingkup dan kedalaman pembahasan:**
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3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Paper tidak menyampaikan metodologi secara khusus tetapi berupa teori model matematik, untuk referensi hanya 6 yang terbit kurang dari 10 tahun (referensi ada 20).
4. **Kelengkapan unsur dan kualitas terbitan:**
   Kualitas terbitan bagus, sitasi, gambar dan referensi jelas terbit pada jurnal terindeks scopus

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Reviewer 1

Dr. Wahyudi, ST, MT
NIP. 196906121994031001
Unit : Teknik Elektro FT UNDIP

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d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	12,00			11,00
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2. **<u>Ruang lingkup dan kedalaman pembahasan:</u>**
   Tulisan dalam artikel mengulas tentang upaya untuk mengaplikasikan pembangkitan tegangan tinggi agar terjadi peluahan korona dengan memanfaatkan bentuk elektroda kawat (line) dan bidang) sebagai anoda dan katoda peluahan (discharge). Pemodelan untuk keperluan analisis perancangan dilakukan untuk menghasilkan peluahan yang diinginkan. Verifikasi pemodelan di lakukan dengan percobaan laboratorium untuk mengetahui lebih lanjut hasil hipotesis model formulasi yang dilakukan. Pembahasan cukup focus dan runut serta mendalam untuk mengungkap model elektroda peluahan yakni mdel line-plane dan kemudian diverifikasi dengan percobaan.
3. **<u>Kecukupan dan kemutakhiran data/informasi dan metodologi:</u>**
   Karya tulis ini mengacu kebeberapa Pustaka yang relevan untuk mengungkat lebih jauh model elektrobidang dalam peluahan korona yang dipercobakan dan diteliti. Tercatat 20 referensi yang relevan dari paper jurnal yang kredibel.
4. **<u>Kelengkapan unsur dan kualitas terbitan:</u>**
   Tulisan ini diterbitkan di jurnal The European Physical Journal Applied Physics (EPJ AP) volume 89, 30801 (2020 dan dapat diakses di https://doc-pak.undip.ac.id/2881/1/10.1051%40epjap%402020200011.pdf, Terindex oleh SCOPUS. Jurnal ini cukup rutin diterbitkan oleh publisher setiap edisinya dan kualitas cetakan, ukuran dan font hurufnya dapat terbaca dengan baik.

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Mochammad Facta, S.T., M.T., Ph.D.
NIP. 197106161999031003
Unit : Teknik Elektro FT UNDIP

Document details

EPJ Applied Physics
Volume 89, Issue 3, 1 March 2020, Article number 30801

A study of line-plane configuration in the Corona discharge theory (Article)

Wardaya, A.Y.[a,b] ✉, Muhlisin, Z.[a,c], Hudi, A.[a], Suseno, J.E.[a], Nur, M.[a,c], Kinandana, A.W.[a,c], Windarta, J.[b]

[a]Department of Physics, Faculty of Science and Mathematics, Diponegoro University, Semarang, Indonesia
[b]Master of Energy Program, School of Post Graduate Studies, Diponegoro University, Semarang, Indonesia
[c]Center for Plasma Research, Diponegoro University, Semarang, Indonesia

Abstract

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Research on corona discharges from plasma generators has been studied using the line-plane configurations (L-PC). The purpose of this study is to calculate the comparison of the level of conformity of the voltage current characteristic curve (I-V) from the simulation results of numerical calculations of the electrode geometry function and the results of experimental data. There is an electrode (electrode 1) in the form of a rectangular plate with a very thin thickness which has a length and width of a and b respectively in an upright position (line configuration). Electrode 1 has a distance of c to electrode 2 which is in a lying position (plane configuration) below the electrode 1. Furthermore, by using variation of c of 2.5 cm, 2.8 cm, 3.1 cm and 3.4 cm, the two electrodes are connected to the plasma generating equipment, thus producing a plasma discharge that comes out of the tip of the electrode 1 towards electrode 2. Research results from all variations of c prove that there is a high degree of suitability between numerical calculations with experimental data by taking the value of the fitting for the sharpness shape factor of k in the area with the largest plasma discharge. © 2020 EDP Sciences.

SciVal Topic Prominence

Topic: Electrohydrodynamics | Heat Transfer Enhancement | Coronas

Prominence percentile: 86.403

Indexed keywords

Engineering controlled terms: Electric corona, Electrodes

Engineering uncontrolled terms: Corona discharges, Electrode geometries, Generating equipments, Line configuration, Numerical calculation, Plane configurations, Rectangular plates, Voltage-current characteristics

Engineering main heading: Electric discharges

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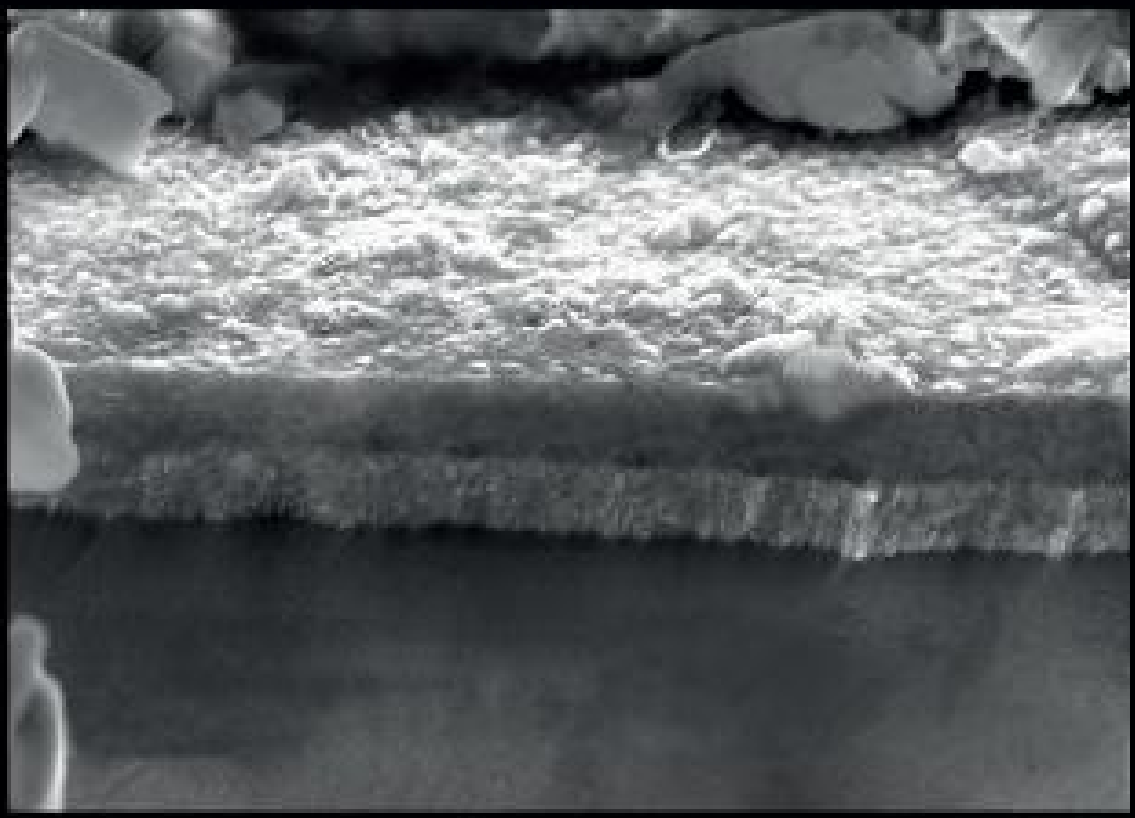

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Regular Article

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Dhiman Kumar Das, Sushant Kumar Sahoo, Pranati Purohit and Sukadev Sahoo

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D. Mohan Radheep

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Published online: 22 March 2021, DOI: 10.1051/epjap/2021200297

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International Symposium on Electromagnetic Fields in Mechatronics, Electrical and Electronic Engineering (ISEF 2019)

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Regular Article

Design of a superconducting machine and its cooling system for an aeronautics application

Alexandre Colle, Thierry Lubin and Jean Leveque

Eur. Phys. J. Appl. Phys., 93 3 (2021) 30901

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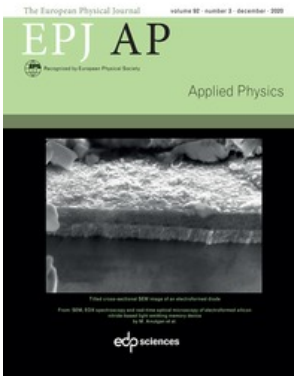

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Zaragoza
Spain
Website

Manfred Bayer
Technische Universität Dortmund
Lehrstuhl für Experimentelle Physik II
44221 Dortmund
Germany

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University of Strathclyde
Department of Physics
John Anderson Building
107 Rottenrow
G4 ONG Glasgow
United Kingdom
Website

Michel Négrerie
Ecole Polytechnique
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91128 Palaiseau
France

Jean-Michel Nunzi
Queen's University
Department of Chemistry
90 Bader Lane
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Maria Angeles Diaz-Garcia
Universidad de Alicante
Depto. Fisica Aplicada & Instituto Universitario de Materiales
03080 Alicante
Spain
Website

Subhasish Dutta Gupta
School of Physics
University of Hyderabad
Hyderabad 500046
India
Website

Christopher Ewels
Institut des Materiaux Jean Rouxel
2 rue de la Houssiniere - B.P. 32229
F-44322 Nantes Cedex 3
France

Bruno Gallas
Institut des NanoSciences de Paris (INSP)
UMR7588
Paris
France

Irina Graur Martin
Polytech Marseille
Aix-Marseille Université
Marseille
France

Mathieu Kociak
Université Paris-Sud
Laboratoire de Physique des Solides
Orsay
France
Website

Christine Leroux
Université de Toulon
IM2NP
Toulon
France

Yuxiang Li
Shandong University
School of Physics
#5 Hongjialou
250100 Jinan, Shandong
China
Website

Website

Lionel Pichon
LGEP-SUPELEC
11 rue Joliot Curie
91192 Gif-sur-Yvette
France

Laurent Pizzagalli
Department of Physics and Mechanics of Materials
Institute P'SP2MI
Bd Marie et Pierre Curie
F-86962 Futuroscope Chasseneuil Cedex
France
Website

Joaquim Puigdollers
Universitat Politècnica Catalunya
Dept Eng Electrònica and CrNE Calle Jordi Girona, 31
08034 Barcelona
Spain
Website

Adel Razek
LGEP - SUPELEC
Plateau du Moulon
91192 Gif-sur-Yvette Cedex
France

Gilles Renaud
CEA-Grenoble
IRIG/MEM/NRS
Grenoble
France

Ruth V. Sabariego
KU Leuven
Department of Electrical Engineering
Kasteelpark Arenberg 10
3001 Leuven
Belgium

Wilfried Sigle
Max Planck-Institut für Metall forschung
StEM
Stuttgart
Germany
Website

Jun Xu
School of Electronic Science and Engineering
Nanjing University
Nanjing 210093
China
Website

External Advisors

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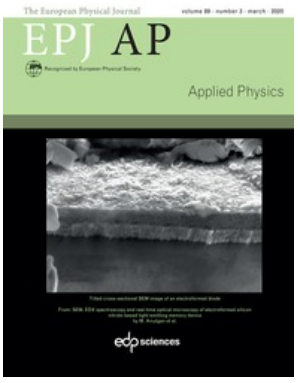

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THE EUROPEAN PHYSICAL JOURNAL APPLIED PHYSICS

Regular Article

A study of line-plane configuration in the Corona discharge theory

Asep Yoyo Wardaya[1,2,*], Zaenul Muhlisin[1,3], Alam Hudi[1], Jatmiko Endro Suseno[1], Muhammad Nur[1,3], Andi Wibowo Kinandana[1,3], and Jaka Windarta[2]

[1] Department of Physics, Faculty of Science and Mathematics, Diponegoro University, Semarang, Indonesia
[2] Master of Energy Program, School of Post Graduate Studies, Diponegoro University, Semarang, Indonesia
[3] Center for Plasma Research, Diponegoro University, Semarang, Indonesia

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Abstract. Research on corona discharges from plasma generators has been studied using the line-plane configurations (L-PC). The purpose of this study is to calculate the comparison of the level of conformity of the voltage current characteristic curve (I–V) from the simulation results of numerical calculations of the electrode geometry function and the results of experimental data. There is an electrode (electrode 1) in the form of a rectangular plate with a very thin thickness which has a length and width of a and b respectively in an upright position (line configuration). Electrode 1 has a distance of c to electrode 2 which is in a lying position (plane configuration) below the electrode 1. Furthermore, by using variation of c of 2.5 cm, 2.8 cm, 3.1 cm and 3.4 cm, the two electrodes are connected to the plasma generating equipment, thus producing a plasma discharge that comes out of the tip of the electrode 1 towards electrode 2. Research results from all variations of c prove that there is a high degree of suitability between numerical calculations with experimental data by taking the value of the fitting for the sharpness shape factor of k in the area with the largest plasma discharge.

1 Introduction

Plasma is gas which is ionized in an electric discharge [1]. When gas is conditioned on a plasma state, charged particles in the gas have a smaller potential energy among inter particles compared to their kinetic energy so that the particles are free to move [2]. Plasma generation through the concept of electrical discharge is known as corona incandescent plasma discharge [3,4]. There is a common plasma model in the industry called capacitively coupled plasma (CCP) [5,6]. The electrode configuration of the CCP is similar to the principle of a capacitor in an electronic circuit. This model consists of two asymmetrical electrodes with one electrode having a very sharp surface and the other electrode having a nearly horizontal surface. Incandescent corona plasma discharges will appear around the electrode with high/sharp curvature due to the area having a high gradient potential [7]. This fact that supports the dependence of the electric current value on the electrode geometrical curvature in the case of the corona discharge is that the geometrical shape of the electrode which is sharper will produce a plasma flow that is getting bigger.

Numerous papers on corona discharge cases or ordinary electrical circuits using capacitor or CCP components often discuss the characteristics curves of current and voltage from all sorts of electrode configurations. These configuration models include tip-plane configuration [8], cylinder-wire-plate configuration [9], sub-millimeter electrode gap configuration [10], point-to-ring configuration [11], needle-to-plate configuration [12], multi point-plane configuration [13] and coaxial Cylinders [14]. Most discussions concerning characteristic models of current and voltage system are only experimental, except for journals of [8,14], which detailed the (I–V) characteristic curves from numerical calculations as well as comparisons with experimental results. There is a very striking difference in the (I–V) characteristic value ratio between [8] and [14]. The (I–V) characteristic of [8] is based on the geometrical shape of the electrode capacitance in the case of an ordinary electric circuit while the (I–V) characteristic of [14] uses the corona discharge curve approach formula. The value of the electric current obtained from [14] is almost close to 10^6 times the value of the electric current from [8].

There are also several papers that discuss the concept of corona discharge not focused on the formulation of (I–V) characteristic curves and the configuration of the electrodes (curvature of the electrodes geometry) but instead discusses the influence of certain factors when event happened of corona discharges such as EHD flow [11], convective heat transfer [15], electric wind [16,17] and electrostatic precipitation [18,19]. From papers [15–19], it can be concluded that corona discharge is a fairly complex physical event, so that the (I–V) characteristic curves are not only influenced by the curvature of the electrodes geometric but also influenced by other factors such as convective heat transfer, electric wind and electrostatic

* e-mail: asepyoyowardayafisika@gmail.com

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Regular Article

Stimulated Brillouin gain spectroscopy in a confined spatio-temporal domain (30 μm, 170 ns)

Lionel Djadaojee[1,*], Albane Douillet[1,2], and Jules Grucker[1]

[1] Laboratoire Kastler Brossel, ENS-PSL Université, Sorbonne Université, CNRS, Collège de France, 24 rue Lhomond, 75005 Paris, France
[2] Université d'Evry-Val d'Essonne, Université Paris-Saclay, Boulevard François Mitterrand, 91000 Evry, France

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Abstract. The Brillouin gain spectrum of a test sample (liquid acetone at room temperature) on scales simultaneously confined in space (∼30 μm) and time (∼170 ns) is reported. This is done using a pulsed stimulated Brillouin scattering gain spectrometer in a $\theta \approx 90^\circ$ crossing beam configuration. After having identified and corrected for different sources of background signals, we obtained a Brillouin gain spectrum allowing an accurate measurement (MHz range) of the Brillouin frequency (few GHz). This is of interest for probing acoustic properties of transparent media subjected to repetitive fast transient phenomena on small length scales.

1 Introduction

Brillouin scattering refers to the scattering of light by a transparent medium due to the coupling of incoming photons with density fluctuations (phonons) [1]. When analyzed, the frequency and the linewidth of the scattered light contain valuable information on the scattering material such as the speed of sound and the phonon lifetime. The energy-momentum conservation in the collision between an incoming photon and a phonon of the material imposes that the Brillouin scattered light is frequency shifted by the amount:

$$\Omega_B = 2n\omega\frac{v}{c}\sin(\theta/2) \tag{1}$$

where n is the index of refraction, ω is the angular frequency of the incident light, v is the speed of sound in the material, c is the speed of light in vacuum, and θ is the angle between the incoming and the scattered light. Ω_B is called the Brillouin angular frequency. From equation (1), knowing n, ω and θ, one readily sees that the measurement of Ω_B gives access to the speed of sound of the material. The Brillouin linewidth gives the phonon lifetime [2]. Stimulated Brillouin Scattering (SBS) in the so-called amplifier configuration consists in crossing two independent laser beams in the medium at a given angle. One laser is referred as the pump (intensity I_1 (W/m^2), angular frequency ω_1) and the other one as the probe (I_2, ω_2). We shall call L the interaction length between the two lasers. In the limit of constant pump intensity I_1, the probe intensity $I_2(L)$ after interaction with the pump and the medium over a distance L is given by:

$$I_2(L) = I_2(0)\exp\left(g(\Omega)I_1L\right) \tag{2}$$

where $I_2(0)$ is the incoming probe intensity and $g(\Omega)$ is the so-called Brillouin gain factor expressed in m/W. It depends both on the thermodynamic properties of the medium and the angular frequency difference between the probe and the pump lasers $\Omega = \omega_2 - \omega_1$. The electrostrictive coupling between the photons and the phonons when Ω approaches Ω_B results in the probe intensity exponential growth ($\Omega > 0$) as it propagates through the medium in the pump light field: this is the SBS effect, first experimentally demonstrated by Chiao et al. in the 60's [3]. It must be noted that if $\Omega < 0$, the Brillouin gain factor is negative and energy is transferred from the probe to the pump field so that the probe intensity experiences exponential decay. The Brillouin gain factor $g(\Omega)$ is expected to be a Lorentzian function of Ω of central angular frequency Ω_B and linewidth Γ_B [2]. Stimulated Brillouin Gain (Loss) Spectroscopy consists in measuring the $g(\Omega)$ function in order to access to the values Ω_B and Γ_B of a given medium. To that purpose, the ratio $I_2(L)/I_2(0)$ is measured as a function of Ω by maintaining one of the two lasers at a fixed frequency while tuning the other laser frequency. Pohl et al. in 1970 were the first to measure a Brillouin gain spectrum [4]. They shifted the frequency of the probe laser by generating a Brillouin backscattered light (SBS generator [2]) at angular frequency $\omega_{B_g} = \Omega = \omega_2 - \omega_1$ in a mixture of liquids. By changing the composition of the liquid mixture, they were able to tune $\omega_{B_g} = \Omega$. Since this pioneering work, numerous experimental and theoretical works have been devoted to Stimulated Brillouin Gain (SBG) spectroscopy. Unlike the Pohl's experiment, SBG spectrometers are now based on a frequency tunable laser (pump or probe) and can

* e-mail: lionel.djadaojee@lkb.ens.fr

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Regular Article

Determining the exciton diffusion length of copper phthalocyanine in operating planar-heterojunction organic solar cells

Xi Guan[1], Shiyu Wang[1], Wenxing Liu[1], Dashan Qin[1,2*] and Dayan Ban[3]

[1] Hebei Key Laboratory of Functional Polymers, School of Chemical Engineering, Hebei University of Technology, Tianjin 300130, P.R. China
[2] Tianjin key laboratory of chemical process safety, School of chemical engineering, Hebei university of technology, Tianjin 300130, P.R. China
[3] Department of Electrical and Computer Engineering, University of Waterloo, 200 University Ave. West, Waterloo, ON, N2L 3G1, Canada

[*] e-mail: qindashan06@aliyun.com

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Abstract

Organic solar cells based on planar copper phthalocyanine (CuPc)/C_{60} heterojunction have been characterized, in which a 2 nm-thick layer of bathocuproine (BCP) is inserted into the CuPc layer. The thin layer of BCP allows hole current to tunnel it through but blocks the exciton diffusion, thereby altering the steady-state exciton profile in the CuPc zone (zone 1) sandwiched between BCP and C_{60}. The short-circuit current density (J_{SC}) of device is limited by the hole-exciton scattering effect at the BCP/CuPc (zone 1) interface. Based on the variation of J_{SC} with the width of zone 1, the exciton diffusion length of CuPc is deduced to be 12.5–15 nm. The current research provides an easy and helpful method to determine the exciton diffusion lengths of organic electron donors.

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