

**FACULTY OF APPLIED SCIENCES**  
**SABARAGAMUWA UNIVERSITY OF SRI LANKA**

**OUT OF THE PRESS**  
OUR PUBLICATIONS - SEPTEMBER

**VOLUME I ISSUE 2**  
**06<sup>TH</sup> OCTOBER 2021**



# **PEER-REVIEWED JOURNAL ARTICLES**

## Deep Continual Learning for Emerging Emotion Recognition

Selvarajah Thuseethan, Sutharshan Rajasegarar, John Yearwood

### ABSTRACT

Understanding an unknown facial emotion that emerges in the future underpins significant impacts in various domains. Knowing the fact that emotional states grow in vocabulary, new emotional states need to be adapted while the existing knowledge of known emotional states is preserved. While human beings spontaneously perform this task, the challenge is, how a deep learning technique can effectively recognize an unknown emotion category in the future. Although the deep convolutional neural network has shown excellent emotion recognition performances in the past, it is conventionally a predefined multi-way classifier showing little resilience towards adding a new emotion class. Considering the aforementioned challenge, in this paper, we propose a generic deep convolutional neural network-based architecture that constantly absorbs the upcoming emotion categories and recognizes them effectively. We further propose an indicator loss, which is associated with the distillation mechanism that preserves the existing knowledge. In order to demonstrate the feasibility of our proposed method, we evaluated our model using benchmark emotion datasets. The results confirm that the proposed approach is superior in recognizing unknown emotional states compared to continual learning benchmarks. Further, our proposed method demonstrates higher accuracy, compared to the transfer learning baselines.

#### ABOUT THE JOURNAL

IEEE TRANSACTIONS ON MULTIMEDIA

IMPACT FACTOR – 6.513

DOI - 10.1109/TMM.2021.3116434

#### OUR SCHOLAR

MR. SELVARAJAH

THUSEETHAN

LECTURER (PROB.)

THUSEETHAN@APPSC.SAB.AC.L



## Ultrasound assisted extraction and quantification of targeted bioactive compounds of *Centella asiatica* (Gotu Kola) by UHPLC-MS/MS MRM tandem mass spectroscopy

Rasangani Sabaragamuwa, Conrad O. Perera, Bruno Fedrizzi

### ABSTRACT

*Centella asiatica* (Gotu Kola) is a green leafy vegetable rich in phytochemicals mainly including triterpenes and caffeoylquinic acids. Fresh leaves of this plant are consumed in salads and beverages in a variety of cuisines around the world. This is a well-known functional food for its neuroprotective and cognition enhancing properties in traditional societies.

HPLC-DAD at lower wavelengths commonly used to identify and quantify major triterpenes of *C. asiatica* extracts, but associated with few drawbacks. This paper discusses a specific, sensitive and validated method developed based on UHPLC-ESI-MS-MS-MRM tandem mass spectroscopy for targeted quantification of *C. asiatica* bioactive compounds.

The validated method enabled a precise estimation of major triterpenes and chlorogenic acid in *C. asiatica* in a shorter time. The findings of this study will contribute to the information on chemotype variation of *C. asiatica* plant grown under unique geographical, environmental and climatic conditions in New Zealand.

#### ABOUT THE JOURNAL

FOOD CHEMISTRY

IMPACT FACTOR – 7.514

DOI -

[HTTPS://DOI.ORG/10.1016/J.FOODCHEM.2021.131187](https://doi.org/10.1016/j.foodchem.2021.131187)

#### OUR SCHOLAR

DR. RASANGANI

SABARAGAMUWA

SENIOR LECTURER

[RASANGI@APPSC.SAB.AC.LK](mailto:RASANGI@APPSC.SAB.AC.LK)



## Antimony contamination and its risk management in complex environmental settings: A review

Nanthi Bolan, Manish Kumar, Ekta Singh, Aman Kumar, Lal Singh, Sunil Kumar, S. Keerthanan, Son A. Hoang, Ali El-Naggar, Meththika Vithanage, Binoy Sarkar, Hasintha Wijeysekara, Saranga Diyabalanage, Prasanthi Sooriyakumar, Ajyan Vinu, Hailong Wang, M.B. Kirkham, Sabry M. Shaheen, Jörg Rinklebe, Kadambot H.M. Siddique

### ABSTRACT

Antimony (Sb) is introduced into soils, sediments, and aquatic environments from various sources such as weathering of sulfide ores, leaching of mining wastes, and anthropogenic activities. High Sb concentrations are toxic to ecosystems and potentially to public health via the accumulation in food chain. Although Sb is poisonous and carcinogenic to humans, the exact mechanisms causing toxicity still remain unclear. Most studies concerning the remediation of soils and aquatic environments contaminated with Sb have evaluated various amendments that reduce Sb bioavailability and toxicity. However, there is no comprehensive review on the biogeochemistry and transformation of Sb related to its remediation. Therefore, the present review summarizes: (1) the sources of Sb and its geochemical distribution and speciation in soils and aquatic environments, (2) the biogeochemical processes that govern Sb mobilization, bioavailability, toxicity in soils and aquatic environments, and possible threats to human and ecosystem health, and (3) the approaches used to remediate Sb-contaminated soils and water and mitigate potential environmental and health risks. Knowledge gaps and future research needs also are discussed. The review presents up-to-date knowledge about the fate of Sb in soils and aquatic environments and contributes to an important insight into the environmental hazards of Sb. The findings from the review should help to develop innovative and appropriate technologies for controlling Sb bioavailability and toxicity and sustainably managing Sb-polluted soils and water, subsequently minimizing its environmental and human health risks.

#### ABOUT THE JOURNAL

ENVIRONMENT INTERNATIONAL

IMPACT FACTOR – 9.621

DOI -

[HTTPS://DOI.ORG/10.1016/J.ENVINT.2021.10690](https://doi.org/10.1016/j.envint.2021.10690)

8

#### OUR SCHOLAR

DR. HASINTHA WIJEYSEKARA

SENIOR LECTURER

[WIJESEKARA@APPSC.SAB.AC.LK](mailto:WIJESEKARA@APPSC.SAB.AC.LK)



## 2,6-Dicarbonitrile Diphenyl- $\lambda^5$ -Phosphinine (DCNP)—A Robust Conjugated Building Block for Multi-Functional Dyes Exhibiting Tunable Amplified Spontaneous Emission

Umamahesh Balijapalli, Xun Tang, Daichi Okada, Yi-Ting Lee, Buddhika S. B. Karunathilaka, Morgan Auffray, Ganbaatar Tumen-Ulzii, Youichi Tsuchiya, Atula S. D. Sandanayaka, Toshinori Matsushima, Hajime Nakanotani, and Chihaya Adachi

### ABSTRACT

Highly efficient organic light-emitting diodes (OLEDs) with the concurrent achievement of high external electroluminescence quantum efficiency (EQE) and low light amplification thresholds under optical excitation have been considered as a crucial evolution towards the development of high-performance electrically pumped organic semiconductor laser diodes. Herein, a series of 2,6-dicarbonitrile-diphenyl- $\lambda^5$ -phosphinine (DCNP) based donor (D)-acceptor (A) type dyes with different electron-withdrawing and donating moieties have been designed and characterized. The well-manipulated D-A strength with tunable optical properties guaranteed the low amplified spontaneous emission (ASE) thresholds of below  $10 \mu\text{J cm}^{-2}$  and furnished a wide-range color-tuning capability in the visible region (485–595 nm). Furthermore, employing a thermally-activated delayed fluorescence (TADF) molecule as a triplet harvester boosted the performance of OLEDs based on mDMCz that exhibits an exceptional EQE value of 18.4% which is an eightfold enhancement as compared with that of standard fluorescence OLEDs. Also, the TADF-assisted fluorescence (TAF) system enables a reduction of the ASE threshold to  $3 \mu\text{J cm}^{-2}$  and excellent ASE stability. These results provide a rational design strategy to construct color-tunable lasing dyes with reduced ASE thresholds and clarify their potentiality as the fluorescent dopant in the TAF system to utilize up-converted triplet excitons via efficient energy transfer.

#### ABOUT THE JOURNAL

ADVANCED OPTICAL MATERIALS

IMPACT FACTOR – 9.926

DOI: 10.1002/ADOM.202101122

#### OUR SCHOLAR

PROF. ATULA S. D.

SANDANAYAKA

CHAIR PROFESSOR

[SANDANAY@APPSC.SAB.AC.LK](mailto:SANDANAY@APPSC.SAB.AC.LK)





# **PEER-REVIEWED BOOK CHAPTERS**

## Co-Management Initiatives in Bush Fire Management—A Case of Belihuloya Mountain Range, Sri Lanka

B. M. R. L. Basnayake, D. Achini M. De Silva, S. K. Gunatiliake, R. H. N. Rajapaksha M. Sandamith, and I. Wickramarathna

### ABSTRACT

A bushfire can be a real ecological disaster, regardless of whether it is caused by natural forces or human activity. Belihuloya mountain range of Sri Lanka is frequently exposing for man-made bush fires every year during dry season (August- September). Mountain range is home for large variety of flora and fauna and declared as wildlife reserves. Our approach was to investigate the social and economic impact of bush fires, to develop maps on fire scares and fire risk zones and to develop co-management mechanism to mitigate the bush fires. Qualitative data collection tools were instrumental to collect the data from key areas annually damaged by bush fires. Scattered villages home for both Sinhala artisanal farmers and Tamil estate workers. Both bush fires and wild life pestilence made significant impact on poverty stricken villages. Poor interventions of fragile and scattered formal institutions responsible for disaster management were unable to manage or develop mitigation measures for frequent bush fires. Overlapping mandates, poor coordination and decision making and lack of resources hinders the active participation of formal institutions. Study attempt to investigate the possibility of co-management initiatives on bush fire management and develop strategic interventions of locally based management.

#### ABOUT THE BOOK

MULTI-HAZARDS EARLY WARNING AND  
DISASTER RISKS

ISBN 978-3-030-73003-1 (EBook)

DOI - [HTTPS://DOI.ORG/10.1007/978-3-030-](https://doi.org/10.1007/978-3-030-)

#### OUR SCHOLAR


PROF. S. K. GUNATILIAKE

PROFESSOR

SKSG@APPSC.SAB.AC.LK







# **CONFERENCE PROCEEDINGS**

## Evaluation of techno-functional and physicochemical properties of hot air-dried Jackfruit (*Artocarpus heterophyllus* Lam) powder

Narmada Y.D.S. Weerakkody, Chathudina J. Liyanage

### ABSTRACT

Jackfruit (*Artocarpus heterophyllus* Lam) is an evergreen tree native to tropical Asia with many food and non-food uses. As fresh ripened fruits are highly perishable, developing products in the form of fruit powders would be a good approach to retain stability over a long storage time and reduce wastage. Jackfruit powder was produced from a firm-flesh variety available in Sri Lanka by subjecting the flesh to hot air drying at three temperatures (70°C, 80°C and 85°C) and techno-functional and physicochemical properties (moisture, pH, particle size distribution, color, flowability, rehydration properties-solubility, wettability, sinkability and dispersibility) of the powder were evaluated. Retention of natural color and typical aroma were observed in powder obtained at 80°C. The powder obtained at 70°C showed a clumping behavior and an unpleasant aroma while powder obtained at 85°C gave off a cooked aroma. All jack fruit powder samples had desirable moisture contents ( $Md < 5\%$ ). The highest acidity ( $pH\ 4.75 \pm 0.015$ ) was observed in the powder obtained from flesh dried at 70°C. Powder from the sample dried at 85°C showed good flowability properties according to the Carr index (12.50) and Hausner ratio (1.14). The highest median particle size ( $D_{50}$ ) was observed in powder obtained from sample dried at 80°C (949.9 nm) and the lowest value was recorded in the powder obtained at 85°C (871.2 nm). In the powder from the sample dried at 80°C, sinkability was  $7.45 \pm 0.08s$  and the solubility was highest ( $70.06\% \pm 0.19$ ). The powder obtained at 85°C recorded the highest wettability ( $1.48s \pm 0.04$ ) and dispersibility values ( $21.78s \pm 0.24$ ). According to the chroma analysis, lightness was highest ( $81.56 \pm 0.50$ ) in the powder obtained at 80°C and redness was highest ( $5.85 \pm 0.27$ ) in powder obtained at 85°C. Jack fruit powder has a very hygroscopic nature and the adsorption isotherm corresponds to the Type IV isotherm shape revealing a swellable hydrophilic character. It can be concluded that hot air drying is a suitable method for preserving ripen jack fruit and according to color, aroma and solubility properties, the effective temperature for drying is 80°C.

#### ABOUT THE CONFERENCE

2ND UNIFOOD INTERNATIONAL CONFERENCE  
UNIVERSITY OF BELGRADE (ONLINE)  
24TH-25TH SEPTEMBER 2021

#### OUR SCHOLARS

MR. CHATHUDINA J. LIYANAGE  
SENIOR LECTURER  
JANITHA@APPSC.SAB.AC.LK

MS. NARMADA Y.D.S. WEERAKKODY  
TEMP. ASSISTANT LECTURER  
NARWEERAKKODY@GMAIL.COM

