



To Promote the Progress



of Science and Useful Arts

The Director

of the United States Patent and Trademark Office has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this United States

Patent

grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.



Katherine Kelly Vidal



DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

Maintenance Fee Notice

If the application for this patent was filed on or after December 12, 1980, maintenance fees are due three years and six months, seven years and six months, and eleven years and six months after the date of this grant, or within a grace period of six months thereafter upon payment of a surcharge as provided by law. The amount, number and timing of the maintenance fees required may be changed by law or regulation. Unless payment of the applicable maintenance fee is received in the United States Patent and Trademark Office on or before the date the fee is due or within a grace period of six months thereafter, the patent will expire as of the end of such grace period.

Patent Term Notice

If the application for this patent was filed on or after June 8, 1995, the term of this patent begins on the date on which this patent issues and ends twenty years from the filing date of the application or, if the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121, 365(c), or 386(c), twenty years from the filing date of the earliest such application (“the twenty-year term”), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b), and any extension as provided by 35 U.S.C. 154(b) or 156 or any disclaimer under 35 U.S.C. 253.

If this application was filed prior to June 8, 1995, the term of this patent begins on the date on which this patent issues and ends on the later of seventeen years from the date of the grant of this patent or the twenty-year term set forth above for patents resulting from applications filed on or after June 8, 1995, subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b) and any extension as provided by 35 U.S.C. 156 or any disclaimer under 35 U.S.C. 253.



US011807637B1

(12) **United States Patent**
Seo et al.

(10) **Patent No.:** **US 11,807,637 B1**
(45) **Date of Patent:** **Nov. 7, 2023**

(54) **COMPOUND AND USE THEREOF IN TREATING AUTOIMMUNE DISEASES**

(71) Applicant: **PARENCHYMA BIOTECH INC.**,
Busan (KR)

(72) Inventors: **Su Kil Seo**, Busan (KR); **Eun Hye Yoon**, Busan (KR); **Soung Min Lee**, Busan (KR); **Hae Jeong Won**, Busan (KR); **Won Hee Jang**, Busan (KR); **Chae Eun Kim**, Busan (KR)

(73) Assignee: **PARENCHYMA BIOTECH INC.**,
Busan (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/138,817**

(22) Filed: **Apr. 25, 2023**

(30) **Foreign Application Priority Data**

Jun. 21, 2022 (KR) 10-2022-0075726
Feb. 13, 2023 (KR) 10-2023-0018717

(51) **Int. Cl.**
C07D 417/14 (2006.01)
A61K 31/428 (2006.01)
C07D 417/12 (2006.01)
A61P 1/00 (2006.01)

(52) **U.S. Cl.**
CPC **C07D 417/12** (2013.01); **A61P 1/00** (2018.01); **C07D 417/14** (2013.01)

(58) **Field of Classification Search**
CPC .. **C07D 417/14**; **C07D 413/14**; **A61K 31/428**; **A61K 31/5377**; **A61K 31/496**; **A61P 37/00**; **A61P 35/00**
USPC **548/159**, **163**; **544/111**, **368**; **514/367**, **514/233.8**, **252.13**
See application file for complete search history.

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

CN 105777608 A 7/2016
CN 107151231 A 9/2017
KR 10-2009-0015940 A 2/2009
KR 10-2020899 B1 9/2019
KR 10-2021-0040803 A 4/2021
KR 10-2022-0137555 A 10/2022
WO WO 2018/229195 A1 12/2018

OTHER PUBLICATIONS

Gardner, C.R. et al.: Synthesis of retinoid enhancers based on 2-aminobenzothiazoles for anti-cancer activity. *Bioorg. & Medicinal Chem.*, vol. 20, pp. 6877-6884, 2012.*

* cited by examiner

Primary Examiner — Charanjit Aulakh

(74) *Attorney, Agent, or Firm* — The PL Law Group, PLLC

(57) **ABSTRACT**

A compound represented by Formula 1, a stereoisomer thereof or a pharmaceutically acceptable salt thereof may be used for treating or preventing an autoimmune disease or a cancer. The autoimmune disease may be any one selected from the group consisting of inflammatory bowel disease, multiple sclerosis, graft-versus-host disease, asthma, atopy, psoriasis, rheumatoid arthritis, systemic lupus erythematosus and type 1 diabetes. The cancer may be selected from the group consisting of colon cancer, melanoma, liver cancer, gliocytoma, ovarian cancer, colorectal cancer, head and neck cancer, bladder cancer, kidney cell cancer, stomach cancer, breast cancer, metastatic cancer, prostate cancer, gallbladder cancer, pancreatic cancer, blood cancer, skin cancer and lung cancer.

8 Claims, 16 Drawing Sheets

Specification includes a Sequence Listing.