

(12) United States Patent Dierickx

(10) Patent No.: US 11,463,634 B2

Oct. 4, 2022 (45) Date of Patent:

(54) CHARGE DOMAIN BINNING IN A MOS PIXEL

(71) Applicant: Caeleste CVBA, Mechelen (BE)

(72) Inventor: Bart Dierickx, Edegem (BE)

(73) Assignee: CAELESTE CVBA, Mechelen (BE)

(*) Notice: Subject to any disclaimer, the term of this

patent is extended or adjusted under 35

U.S.C. 154(b) by 72 days.

(21) Appl. No.: 16/842,123

(22)Filed: Apr. 7, 2020

(65)**Prior Publication Data**

US 2021/0314504 A1 Oct. 7, 2021

(51) Int. Cl. H04N 5/347 (2011.01)H04N 5/374 (2011.01)H04N 5/343 (2011.01)H01L 27/146 (2006.01)

(52) U.S. Cl. CPC H04N 5/347 (2013.01); H04N 5/343 (2013.01); H04N 5/374 (2013.01); H01L

27/1464 (2013.01)

(58) Field of Classification Search

CPC H04N 5/343; H04N 5/347; G01S 7/4865; G01S 7/4866; G01S 17/88-894; H01L

See application file for complete search history.

(56)References Cited

U.S. PATENT DOCUMENTS

7,564,022	B1*	7/2009	Dierickx H04N 5/217
2016/0073088	A1*	3/2016	250/214 R Cohen H01L 27/14812
2019/0019821	A1*	1/2019	348/46 Fotopoulou G06T 7/521

FOREIGN PATENT DOCUMENTS

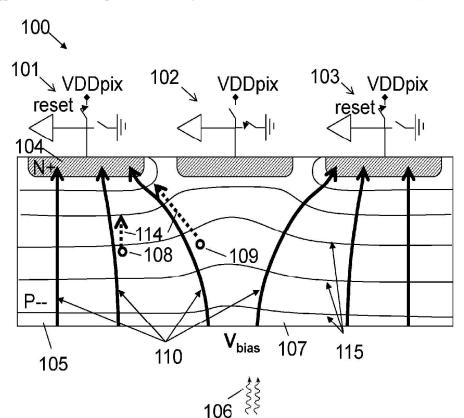
2313927 B1 12/2015 WO 2018046688 A1 3/2018

Primary Examiner — Paul M Berardesca (74) Attorney, Agent, or Firm — Workman Nydegger

(57)ABSTRACT

An array of pixels for charge domain binning in a CMOS image sensor, to increase the readout sensitivity of such a sensor. The array of pixels comprises at least two pixels in a common substrate. At least one of said pixels is configured or configurable to function as a pixel of a first type with a first, higher, charge collecting capability, for collecting charges generated by radiation impinging on the substrate. At least another one of said pixels is configurable to function as pixel of a second type, with a second, reduced, charge collecting capability, and as a pixel of the first type.

15 Claims, 8 Drawing Sheets



^{*} cited by examiner