



US 20240213377A1

(19) **United States**

(12) **Patent Application Publication**  
**BUFFLE et al.**

(10) **Pub. No.: US 2024/0213377 A1**

(43) **Pub. Date: Jun. 27, 2024**

(54) **TRENCH CAPACITOR STRUCTURE WITH  
HYBRID FILLING LAYER**

(30) **Foreign Application Priority Data**

Jun. 4, 2021 (EP) ..... 21305761.5

(71) Applicant: **Murata Manufacturing Co., Ltd.**,  
Nagaokakyo-shi (JP)

**Publication Classification**

(72) Inventors: **Larry BUFFLE**, Grenoble (FR);  
**Frédéric VOIRON**, Barraux (FR);  
**Sophie ARCHAMBAULT**, Grenoble  
Cedex (FR)

(51) **Int. Cl.**  
**H01L 29/94** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **H01L 29/945** (2013.01); **H01L 28/75**  
(2013.01); **H01L 28/90** (2013.01); **H01L 28/91**  
(2013.01)

(21) Appl. No.: **18/594,215**

(57) **ABSTRACT**

(22) Filed: **Mar. 4, 2024**

**Related U.S. Application Data**

(63) Continuation of application No. 17/831,050, filed on  
Jun. 2, 2022, now Pat. No. 11,955,568.

A capacitor structure that includes a silicon substrate having  
a trench structure formed therein; a dielectric disposed over  
a surface of the trench structure, conformal to the surface of  
the trench structure; and a filling layer disposed over the  
dielectric layer and into the trench structure, the filling layer  
including a conductive layer and a polymer layer.

