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(54) **HOT MELT COMPOSITION IN THE FORM OF A FILM FOR USE IN THIN FILM PHOTOVOLTAIC MODULES**

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C08L 33/08 (2006.01)
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CPC **C08J 5/18** (2013.01); **C08L 33/08** (2013.01); **H01L 31/046** (2014.12); **H01L 31/0481** (2013.01); **H01L 31/0488** (2013.01); **C08J 2333/08** (2013.01)

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CPC C08L 33/08; C08J 2333/08; C08J 5/18; H01L 31/046; H01L 31/0481; H01L 31/0488
See application file for complete search history.

(56) **References Cited**
U.S. PATENT DOCUMENTS
2010/0295091 A1* 11/2010 Strzegowski C08L 23/0869 257/E33.059
2017/0125620 A1* 5/2017 Jacques C08L 23/0884
* cited by examiner

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(57) **ABSTRACT**
The invention features a hot melt composition in the form of a film including from 40% by weight to 80% by weight of a non-functionalized alkyl acrylate, from 14% by weight to 50% by weight of an olefin polymer, from 2% by weight to 15% by weight of a first functionalized polymer comprising a functional group selected from the group consisting of epoxides and carboxylic anhydrides, and from 2% by weight to 15% by weight of a second functionalized polymer comprising a functional group capable of reacting with the functional group of the first functionalized polymer.
The hot melt composition in the form of a film has found utility as an encapsulant for thin film photovoltaic modules.

20 Claims, 1 Drawing Sheet

