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(54) **FAMILY OF ANALOGUES AND NADP+ OR NADPH, THEIR PREPARATION AND THEIR APPLICATION IN THERAPEUTICS**

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CPC ..... **C07F 9/65616** (2013.01); **A61K 49/00** (2013.01); **C07H 19/16** (2013.01); **C07H 19/167** (2013.01)

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See application file for complete search history.

(56) **References Cited**

**FOREIGN PATENT DOCUMENTS**

FR 2 893 617 A1 5/2007  
FR 2893617 A1 \* 5/2007 ..... C07D 473/34

**OTHER PUBLICATIONS**

European Search Report, dated Oct. 10, 2011, from corresponding European application.  
International Search Report, dated Aug. 1, 2012, from corresponding PCT application.  
Edward Beaumont et al., "Synchronous Photoinitiation of Endothelial NO Synthase Activity by a Nanotrigger Targeted at Its NADPH Site", Journal of the American Chemical Society, Feb. 1, 2007, pp. 2178-2186, vol. 129, No. 7.  
Edward Beaumont et al., "NO Formation by Neuronal No-Synthase can be Controlled by Ultrafast Electron Injection from a Nanotrigger", Chembiochem, Mar. 2, 2009, pp. 690-701, vol. 10, No. 4.  
Jean-Christophe Lambry et al., "Selective probing of a NADPH site controlled light-induced enzymatic catalysis", Journal of Molecular Recognition, Jul. 1, 2010, pp. 379-388, vol. 23, No. 4.

\* cited by examiner

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(57) **ABSTRACT**

A new family of analogues of NADP+ or NADPH, their preparation and their application in therapeutics.

**10 Claims, 11 Drawing Sheets**