

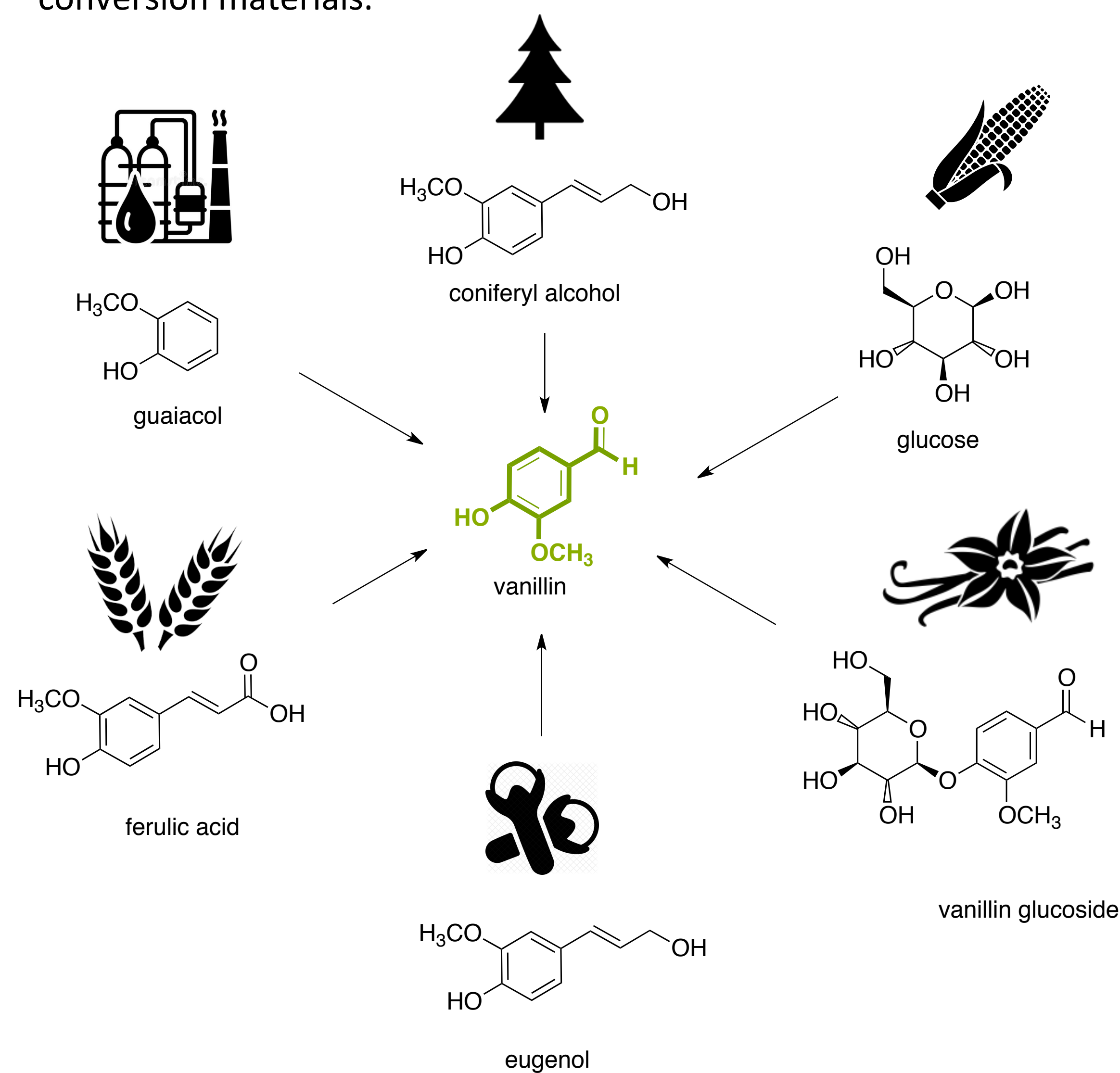
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Introduction

We live in a world where electronic is so well integrated into our lives that it would be hard to imagine a single day without the support of modern technology (mobile phone, LED screen, camera, etc.). These electronic products have become essential tools in our daily routine. However, even if the electronic elements that compose them are more and more efficient, the fact remains that their lifespan is limited and that the resources used for their manufacture are demanding on the environment. A drastic change in the way we harness resources and manage electronic waste is required to minimize negative impacts on our environment. In order to eliminate electronic waste, materials from renewable and recyclable sources are sought. In this regard, forest biomass is considered the only sustainable source of organic carbon and therefore the ideal replacement for petroleum products for the production of chemical compounds. One of the resources derived from biomass, lignocellulose, is the most abundant bio-based material on earth. Indeed, the main value-added compound obtained from the depolymerization of lignin is vanillin. Vanillin is an aromatic compound with three functional groups which can be chemically modified (the methoxy group, the aldehyde function, and the hydroxyl group). The present work describes how vanillin can be expanded into several building blocks for the preparation of energy conversion materials.



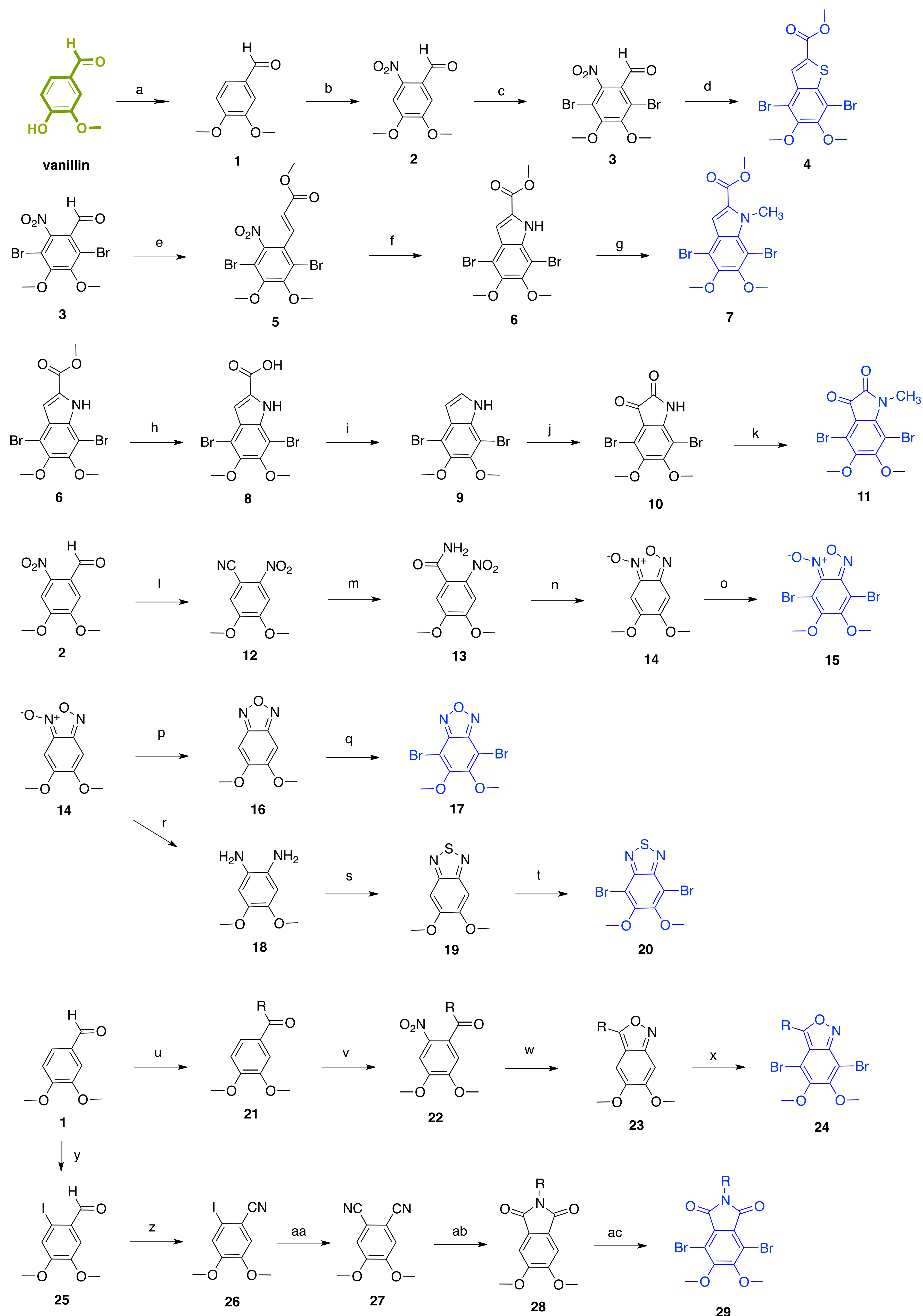
Conclusions

- Vanillin can be readily modified to give derivatives **4**, **7**, **11**, **15**, **17**, **20**, **24** and **29**.
- Overall reaction yields for the preparation of the derivatives are comparable as using petrochemical starting compounds.

Future work will be focused towards the polymerization of the conjugated derivatives as well as the optimisation of the direct heteroarylation polymerization (DHAP) conditions.

Depending on the optoelectronic properties of the obtained material will then be tested in organic electronic devices such as photovoltaic cells.

Synthesis



Conditions: a) Me_2SO_4 , K_2CO_3 , acetone, Δ 4h; b) HNO_3 70%, r.t. 1h; c) NBS, H_2SO_4 , r.t. 12h; d) $\text{HSCH}_2\text{CO}_2\text{CH}_3$, K_2CO_3 , DMF, r.t. 4h; e) $\text{BrCH}_2\text{COOCH}_3$, NaHCO_3 , PPh_3 , H_2O , r.t. 12h; f) PPh_3 , $\text{MoO}_2\text{Cl}_2(\text{dmf})_2$, toluene; g) Me_2SO_4 , K_2CO_3 , acetone, Δ ; h) NaOH , $\text{MeOH}/\text{H}_2\text{O}$; i) Ph_2O , 260°C ; j) I_2O_5 , DMSO 80°C , 30min; k) Me_2SO_4 , K_2CO_3 , acetone, Δ ; l) NH_4OH , I_2 , $\text{H}_2\text{O}/\text{THF}$, r.t. 6h; m) KOH , H_2O_2 , H_2O , 60°C , 4h; n) Br_2 , NaOH , H_2O , 60°C , 6h; o) Br_2 , AcOH , CH_2Cl_2 , r.t. 3d; p) PPh_3 , EtOH , Δ , 6h; q) Br_2 , AcOH , CH_2Cl_2 , r.t. 3d; r) $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$, EtOH , Δ , 12h; s) SOCl_2 , Et_3N , DCM; t) Br_2 , AcOH , DCM, r.t. 3d; u) Mg , BrR , I_2 cat, THF, $\text{PhI}(\text{AcO})_2$; v) HNO_3 70%, r.t.; w) $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$, EOAc/MeOH ; x) Br_2 , AcOH , CH_2Cl_2 , r.t. 3d; y) I_2 , AgNO_3 , MeOH , r.t. 12h; z) NH_4OH , I_2 , $\text{THF}/\text{H}_2\text{O}$; aa) CuCN , DMF, Δ , 30min; ab) 1) KOH , H_2O_2 , H_2O , 60°C , 4h, 2) K_2CO_3 , DMF, R-Br , r.t. 12h; ac) Br_2 , AcOH , CH_2Cl_2 , r.t. 3d.

Acknowledgments

- Mr. William Dupont
- Mr. Mathieu Mainville

Fonds de recherche
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technologies

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