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Identification of new potent inhibitor of aldose reductase from Ocimum basilicum

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Recent efforts are to develop cure for chronic diabetic complications results in the discovery of potent inhibitors against aldose reductase (ALR2, EC 1.1.1.21) whose role in diabetes is well-evident. In the present work, two new natural products were isolated from the aerial part of *Ocimum basilicum*; 7-(3-hydroxypropyl)-3-methyl-8-β-O-D-glucoside-2H-chromen-2-one (1) and E-4-(6'-hydroxyhex-3'-en-1-yl) phenyl propionate (2) and confirmed their structures with different spectroscopic techniques including NMR spectroscopy etc. The isolated compounds (1, 2) were evaluated for *in vitro* inhibitory activity against aldose reductase (ALR2) and aldehyde reductase (ALR1). The natural product (1) showed better inhibitory activity for ALR2 with IC_{50} value of 2.095±0.77 μM compare to standard sorbinil (IC_{50}=3.14±0.02μM). Moreover, the compound (1) also showed multifolds higher activity (IC_{50}=0.783±0.07μM) against ALR1 as compared to standard valproic acid (IC_{50}=57.4±0.89μM). However, the natural product (2) showed slightly lower activity for ALR2 (IC_{50}=4.324±1.25μM). Moreover, the molecular docking studies of the potent inhibitors were also performed to identify the putative binding modes within the active site of aldose/aldehyde reductases.

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Synthesis and electronic applications of novel conjugated polymers based on thienylenevinylene and thiophene-phenylene-thiophene

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Global environmental and resource concerns dictate that future energy supply and security will become increasingly dependent upon the development of accessible, sustainable and scalable energy technologies. Intensive research efforts from both academia and industry have been dedicated in state-of-art solution-processed organic solar cells for the development of the next-generation solar cell technology. Owing to the readily available carbon feedstock as well as the numerous and flexible synthetic pathways, polymer solar cells (PSCs) gained tremendous attention over silicon solar cell in the past decay due to development of low-cost and quick energy pay-back, solution processable, lightweight and flexible/stretchable, large area photovoltaic panels. Thienylenevinylene (TV) based conjugated materials have showed higher charge-carrier mobilities as a result of large planarity introduced by the vinylene group that is inserted between the two thiophene rings, moreover, it has an important role in lowering the band gap of the conjugated polymers. In addition, electron rich thiophene-phenylene-thiophene fused ring based materials having different substituents like carbon, nitrogen, silicon and germanium could effectively tune the materials properties. Herein, we report the synthesis, characterization and optoelectronic properties of copolymers containing alkyl-substituted and un-substituted thienylenevinylene and thiophene-phenylene-thiophene.

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