# Advanced Synthesis of Potent Photocapacitor Based on Novel 3D-Hierirachical BiVO4 and Self-Synthesized Carbon

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The synthesis of a self-charging through light supercapacitor has been executed with exceptional energy storage properties. Conventional photo capacitors face a major disadvantage of relatively low energy density due to the electrochemical properties of the nanomaterials applied. In this project, a light-responsive supercapacitor has been fabricated using novel nanocompounds. This starts with a 3D-Hierarchically assembled bismuth vanadate (BiVO4) which was synthesized using a novel low temperature chemical bath deposition and growth technique. The 3-dimensional bismuth vanadate acted as a photoanode to dispatch current when exposed to light. The supercapacitor was enforced using a self-synthesized carbon, which was obtained locally by chemically pyrolysing date leaves in order to arrive at a high purity carbon as a cathode material. The carbon was deposited via doctor blade coating deposition. Additionally, METAC was polymerized in order to result in PolyMETAC, a novel, organic, solid based electrolyte, which maximized the operational potential window of the device. The overall supercapacitor achieved a superior capacitance of 363 F/g, with a photoresponse equivalent to 0.8 V and 0.7 mA under continuous and intermittent light exposure. From such results, the calculated energy density was shown to be 50.1 Wh/kg and a power density outcome of 5,000 W/kg. This supercapacitor may form a potent basis to change the electrochemical sector due to the outstanding results achieved, forming a benchmark in light responsive supercapacitors. Furthermore, the synthesis techniques are comparatively scalable and economically friendly, candidating the device with a prosperous future.

**Awards Won:**
Second Award of $2,000
King Abdulaziz &amp
his Companions Foundation for Giftedness and Creativity: On-line Mawhiba Universal Enrichment Program
King Abdulaziz &amp
his Companions Foundation for Giftedness and Creativity: Award of $500