Title:	Strategy to improve the super-capacitive and hydrogen evolution performance of graphitic carbon nitrides via enrichment of carbon content
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Abstract:	Herein, we have explored a strategy via increasing the carbon content to enhance conductivity along with improved surface area of mesoporous graphitic carbon nitride (mp-gCN) in which C/N ratio is calculated to be 1.2 in contrast with the theoretical value and experimental findings of 0.75 and 0.85, respectively. With high carbon content, mp-gCN (168.61 F/g) enhances the capacitive performance as compared to the bulk (7.47 F/g) as well as chemically exfoliated graphitic carbon nitride (exfo-gCN) (40.21 F/g). An asymmetric supercapacitor (ASC) has been made-up using mp-gCN @3D Graphene (3DG) and activated carbon (AC) which imparts high specific capacitance (107.31 F/g, 97.65 mF/cm2), power density (857.14 W kg−1) and energy density (25.18 Wh kg−1), respectively. The fabricated device has been demonstrated an excellent life cycle with 87.6% specific capacity retention, along with 99.2% coulombic efficiency after consecutive charge-discharge of 5000 cycles at a current density of 0.7 mA/cm2. This nanohybrid (mp-gCN @3DG) also reveals an excellent electrocatalytic performance with low onset potential (4.2 mV@1 mA/cm2), Tafel slope (98 mV/dec) and overpotential of 95 mV@10 mA/cm2 for Hydrogen evolution reaction (HER) having excellent catalytic retention of 95% for 27 h. Thus, the low-cost metal-free mp-gCN@3DG is a promising hybrid material for energy storage devices as well as excellent electro-catalyst for renewable energy resources.
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