Title: Optoelectronic properties of a-Si(1-x)C(x)H films grown in hydrogen diluted silane-methane plasma

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Abstract: This work reports on the optoelectronic properties and device application of hydrogenated amorphous silicon carbide (a-Si(1-x)C(x):H) films grown by plasma-enhanced chemical vapour deposition (PECVD). The films with an optical bandgap ranging from about 1.8 to 2.0 eV were deposited in hydrogen diluted silane-methane plasma by varying the radio frequency power. Several n-i-p structures with an intrinsic a-Si(1-x)C(x):H layer of different optical gaps were also fabricated. The optimized devices exhibited a diode ideality factor of 1.4-1.8, and a leakage current of 190-470 pA/cm(2) at -5 V. The density of deep defect states in a-Si(1-x)C(x):H was estimated from the transient dark current measurements and correlated with the optical bandgap and carbon content. Urbach energies for the valence band tail were also determined by analyzing the spectral response within sub-bandgap energy range. (C) 2010 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

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