Amorphous (a-SiC:H) and microcrystalline \( \mu \)-SiC:H hydrogenated silicon carbon alloys are of great importance in photovoltaics and electronics because of their optical gap tunability depending on the carbon content. From a fundamental point of view, silicon carbon alloys represent an intriguing system because, even for a given stoichiometry, the optical and transport properties of films could be strongly dependent on the microstructure and carbon configuration.

The general approach to analyze a-SiC:H alloys optically consists in parameterization of the dielectric function \( \varepsilon(E) \), of the pseudodielectric function of films deposited at (a) \( \text{SiF}_4: \text{CH}_4: \text{H}_2=20:0.2:2.5 \) and (b) \( \text{SiF}_4: \text{CH}_4: \text{H}_2=20:0.2:30 \) sccm gas flow ratios.

In the SiF\(_4\)-CH\(_4\)-H\(_2\) plasma system, the amorphous-to-microcrystalline transition in SiC:H alloys has been found to depend on H\(_2\) flow rate. Figure 2 shows spectroscopic ellipsometric spectra and the corresponding microstructural analysis of SiC alloys deposited at (a) SiF\(_4\)-CH\(_4\)-H\(_2\)=20:0.2:2.5 and (b) SiF\(_4\)-CH\(_4\)-H\(_2\)=20:0.2:30 sccm gas flow ratios.
