SUPPORTING INFORMATION

Efficient Chitosan/Nitrogen-doped Reduced Graphene Oxide Composite Membranes for Direct Alkaline Ethanol Fuel Cells

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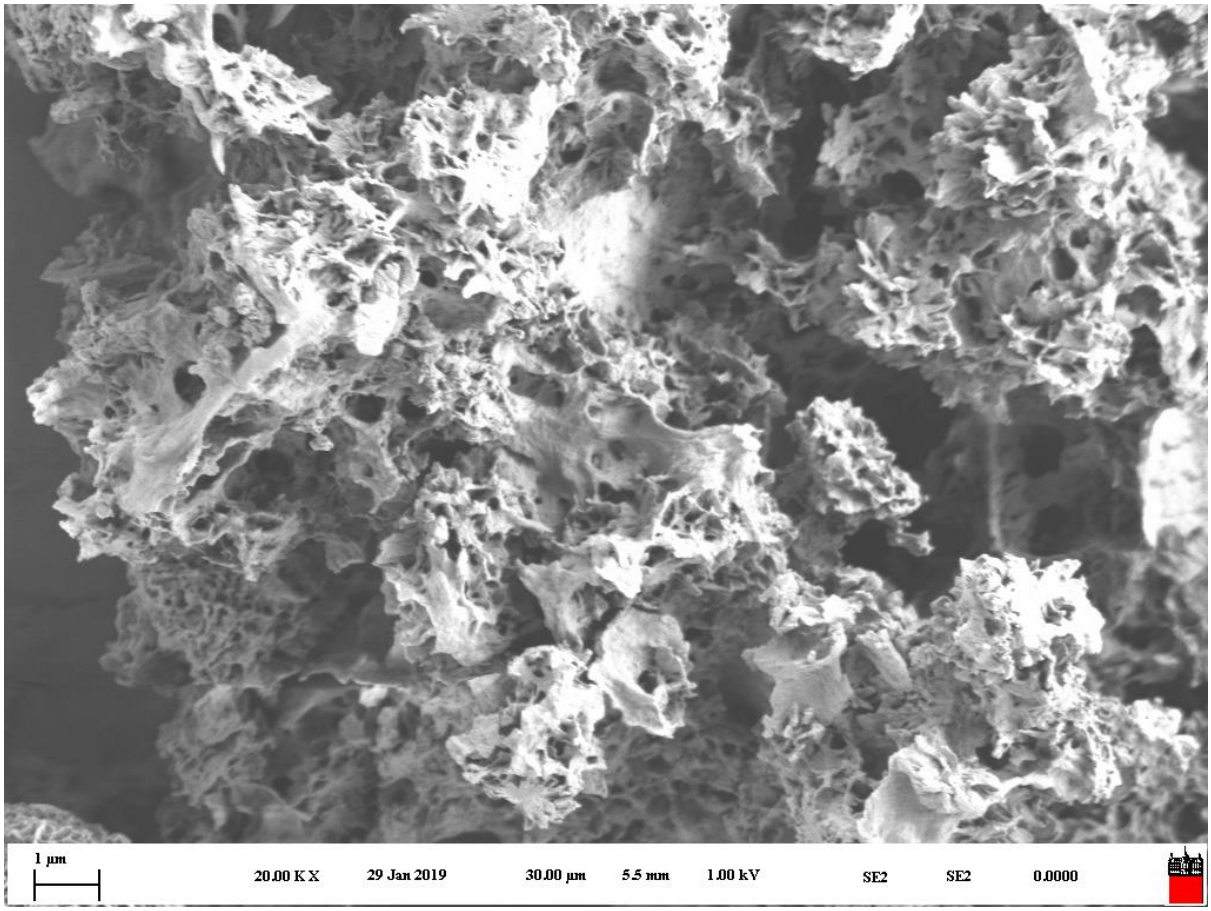

Figure S1. SEM image of **Polyenaminone 4ca[13].**

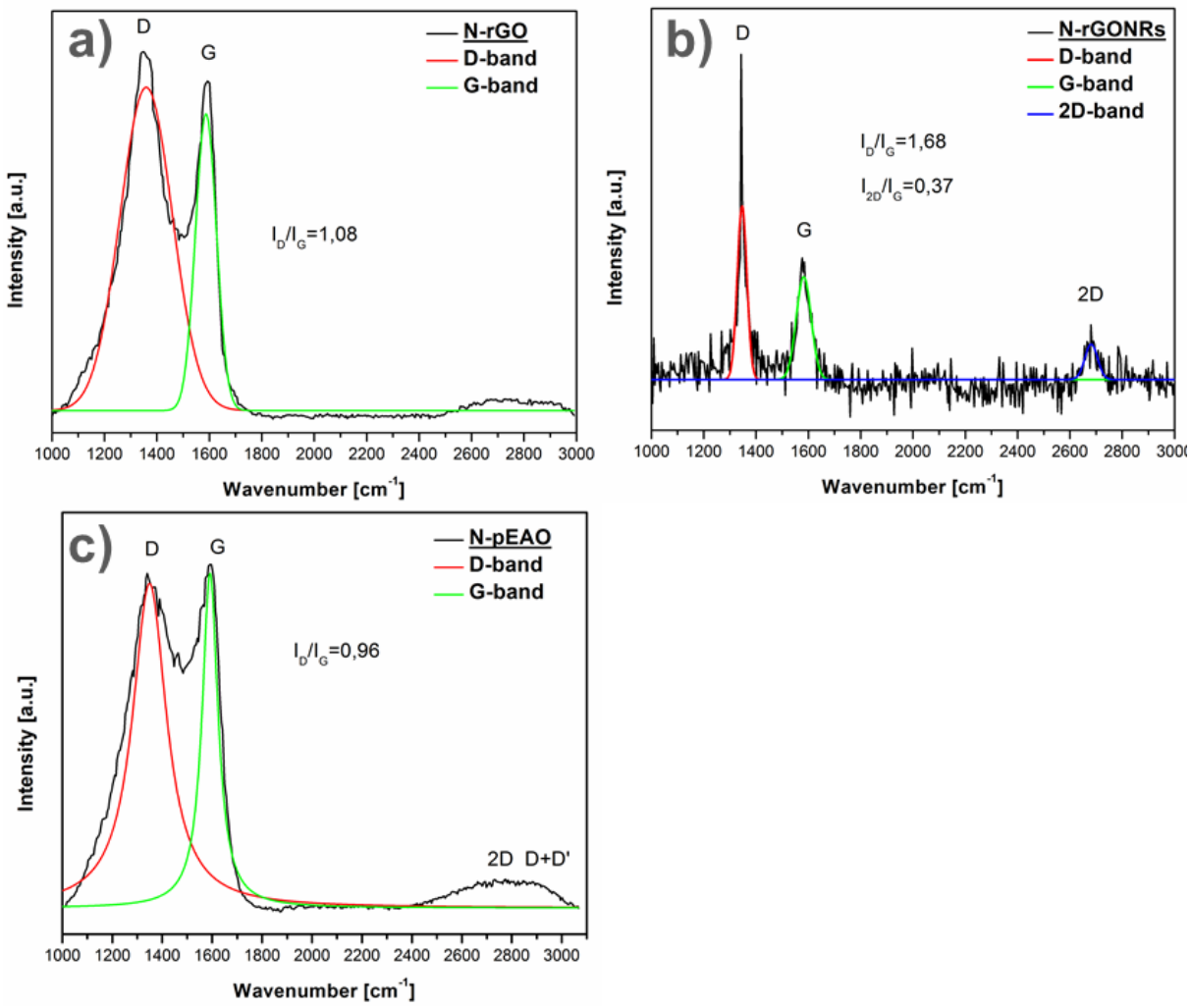

Figure S2. Raman spectra of a) **N-rGO**, b) **N-rGONRs**, and c) **N-pEAO**.

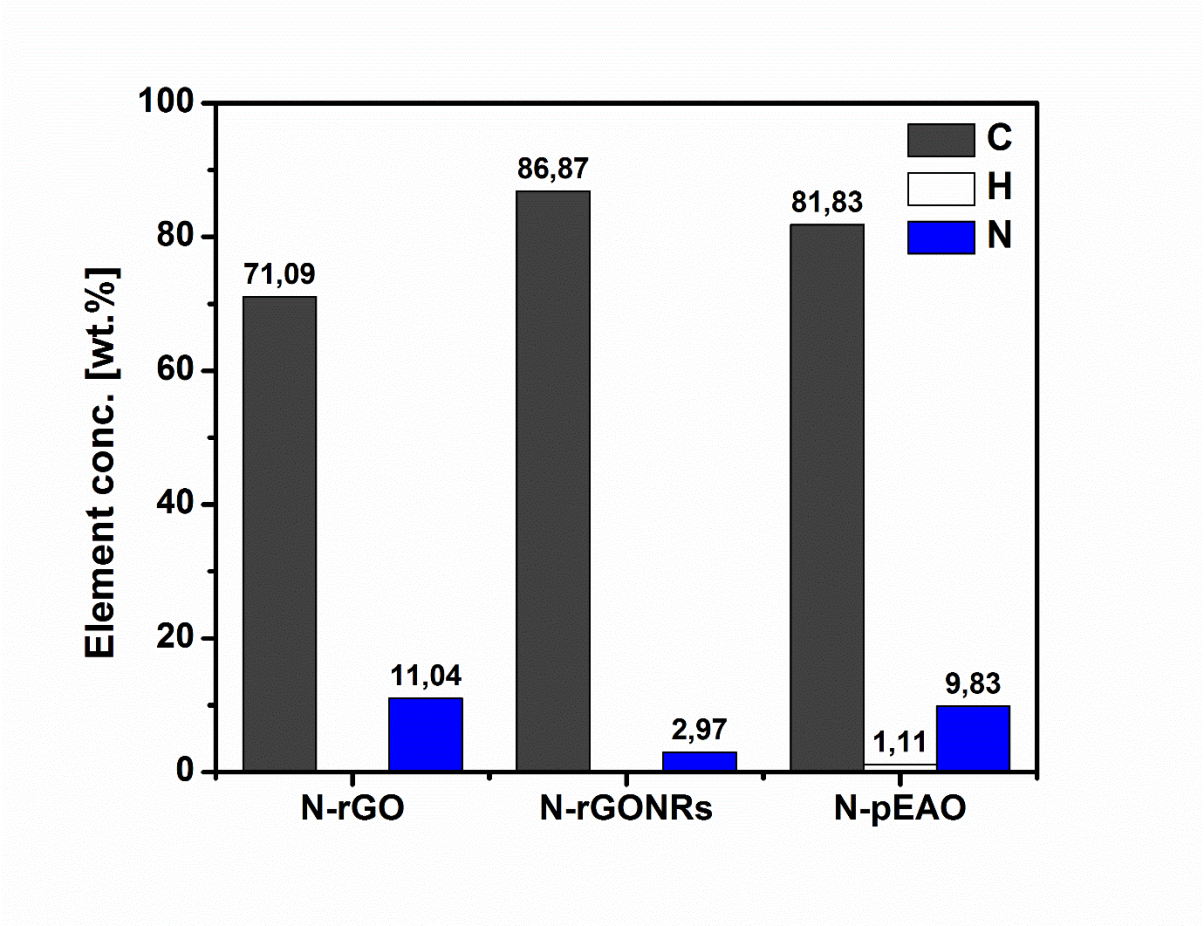

Figure S3. CHN elemental analysis of **N-rGO**, **N-rGONRs**, and **N-pEAO**.

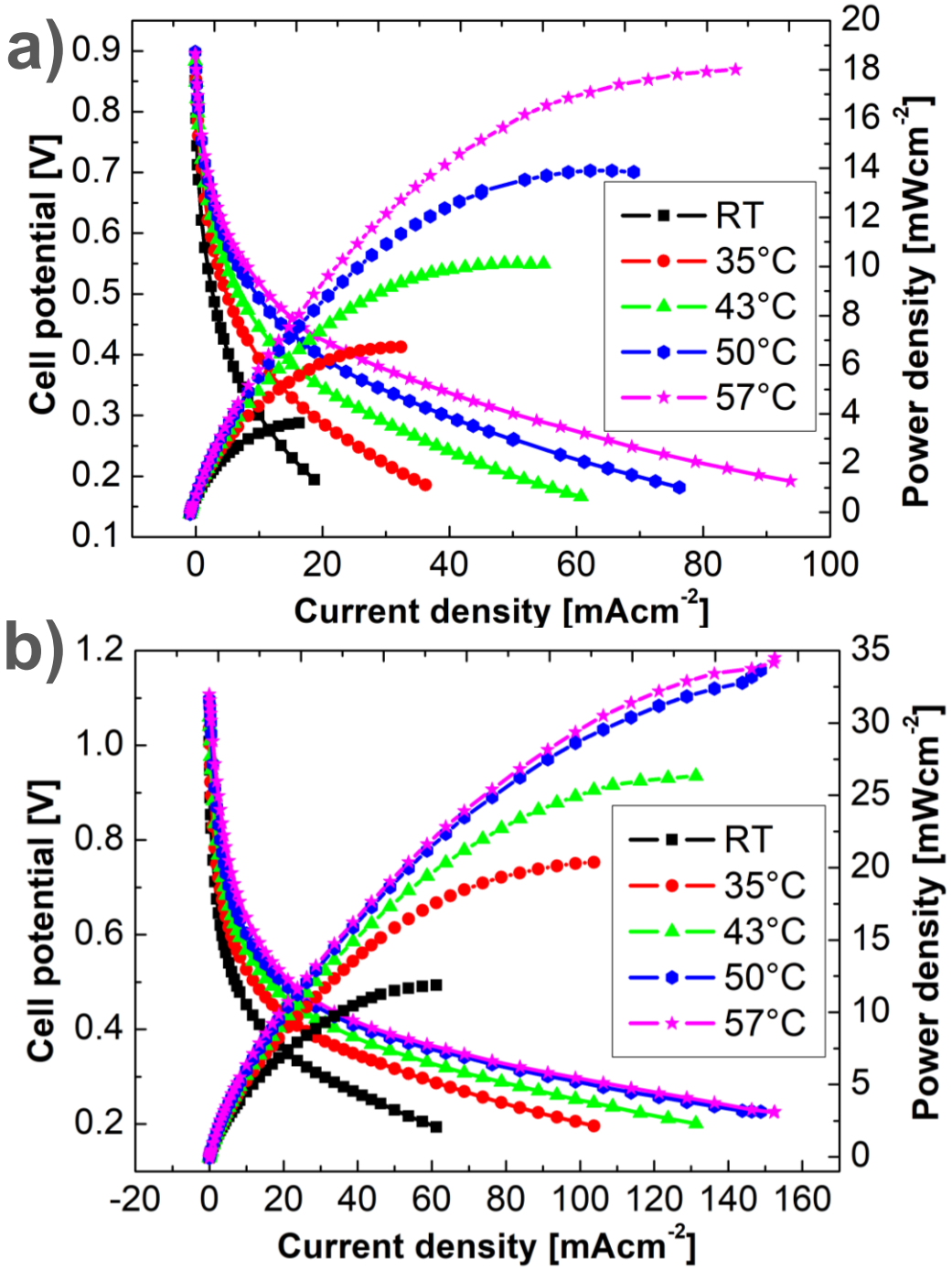

Figure S4. Typical DEAFC discharged cell voltage and power density of CS/**N-rGONRs** (0.07%) as a function of temperature in a) 1 M EtOH/1 M KOH and b) 3M EtOH / 5M KOH**.**

Table S1. $P_{max.}$ and related current density of CS membranes at 57 °C.

	$P_{max.}$ 0.01 % [$mWcm^{-2}$]	**$P_{max.}$ 0.04 % [$mWcm^{-2}$]**	**$P_{max.}$ 0.07 % [$mWcm^{-2}$]**
	1 M EtOH/1 M KOH		
CS/**N-rGO**	3.4 (9.69 $mAcm^{-2}$)	5.6 (23.01 $mAcm^{-2}$)	12.2 (62.81 $mAcm^{-2}$)
CS/**N-rGONRs**	10.7 (56.13 $mAcm^{-2}$)	10.9 (56.18 $mAcm^{-2}$)	18.0 (93.75 $mAcm^{-2}$)
CS/**N-pEAO**	7.4 (38.99 $mAcm^{-2}$)	10.5 (56.14 $mAcm^{-2}$)	12.1 (64.65 $mAcm^{-2}$)
	3 M EtOH/5 M KOH		
CS/**N-rGONRs**	28.9 (152.42 $mAcm^{-2}$)	22.9 (111.22 $mAcm^{-2}$)	34.5 (152.54 $mAcm^{-2}$)
CS/**N-pEAO**	20.5 (136.34 $mAcm^{-2}$)	24.2 (152. 22$mAcm^{-2}$)	21.8 (133.67 $mAcm^{-2}$)