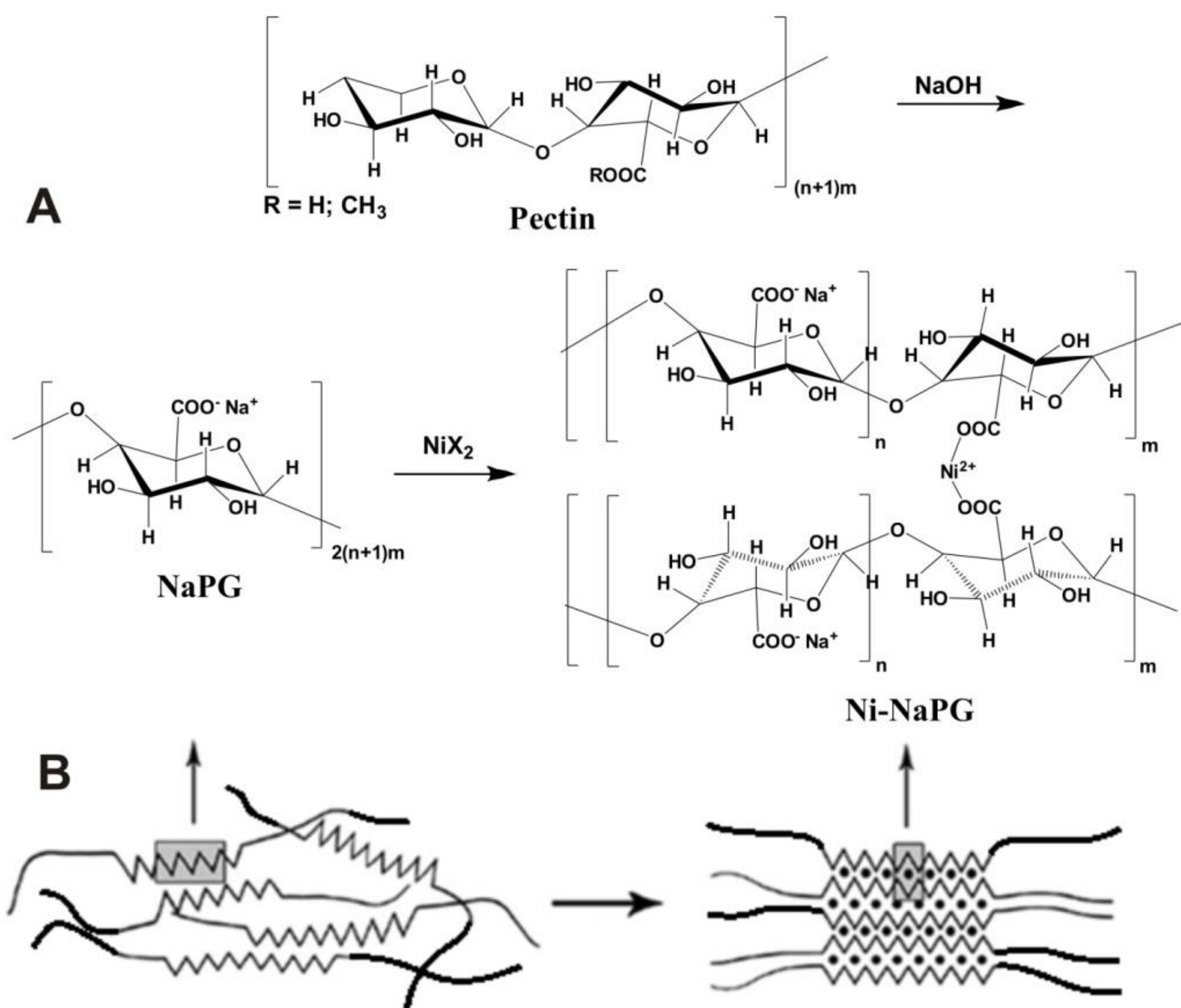




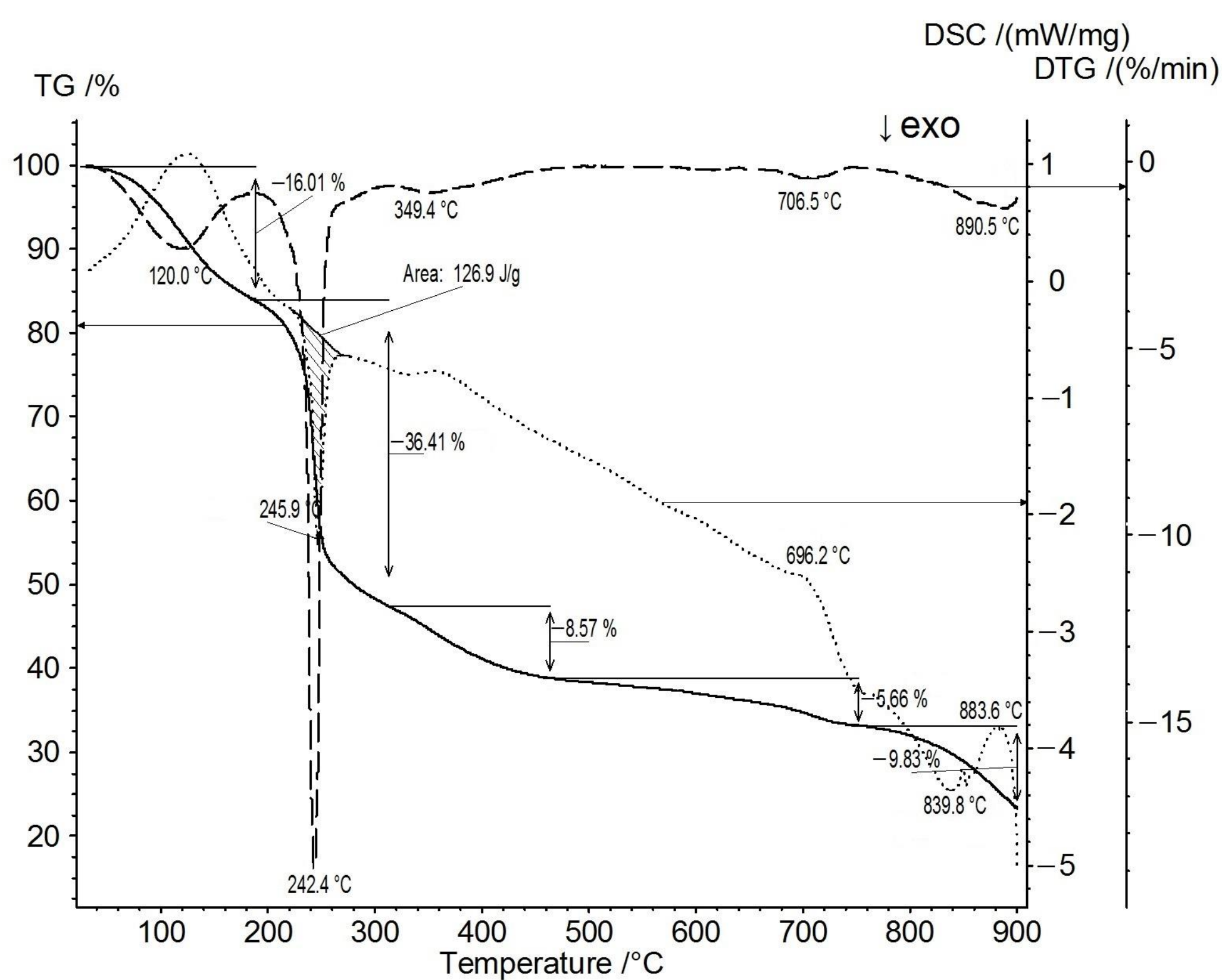
Magnetic Resonance and Magnetism of Carbonized Sodium Pectate Nickel Complex

Sabirova A.F.^{1,2}, Kadirov D.M.², Minzanova S.T.^{1,2}, Morozov V.I.¹, Nizameev I.R.^{1,2}, Drobyshchev S.V.², Batulin R.G.³, Karakhanov A.T.³, Gafurov M.R.³, Kadirov M.K.^{1,2}

1 – Arbuzov Institute of Organic and Physical Chemistry, Kazan, Russia, aigul84saf@mail.ru
 2 – Kazan National Research Technological University, Kazan, Russia
 3 – Kazan Federal University, Kazan, Russia



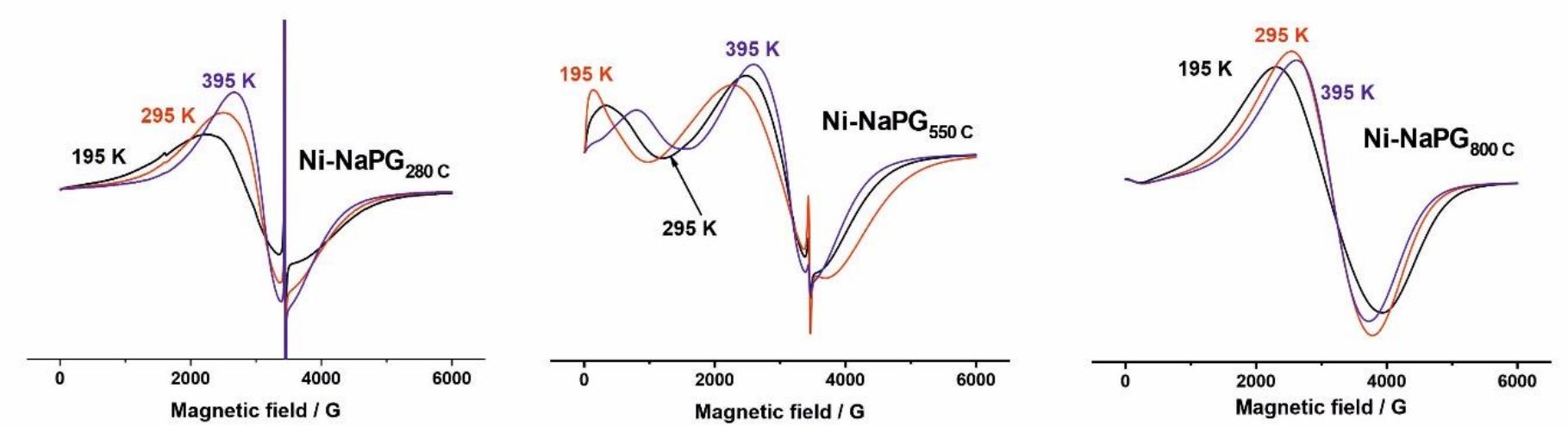
Schemes for the synthesis of pectin polysaccharide complexes ($n=3-10$; $m=10-35$) with nickel (A) and the formation of polymer-complex structures according to the "egg-box" model (B - right)



TG/DSC curves of Ni(20%)-NaPG in an argon atmosphere: TG—solid line; DTG—dotted line; and DSC—dashed line

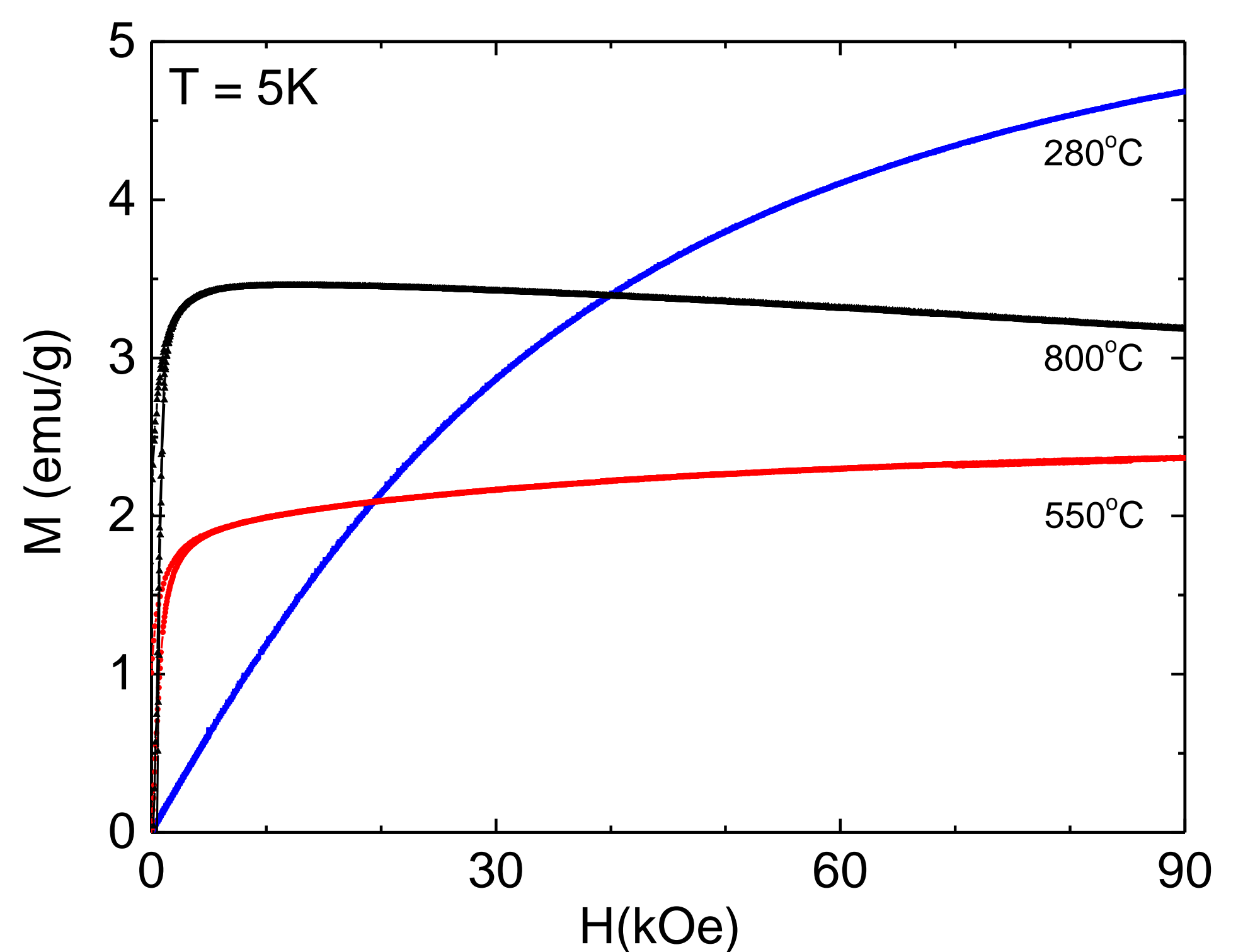
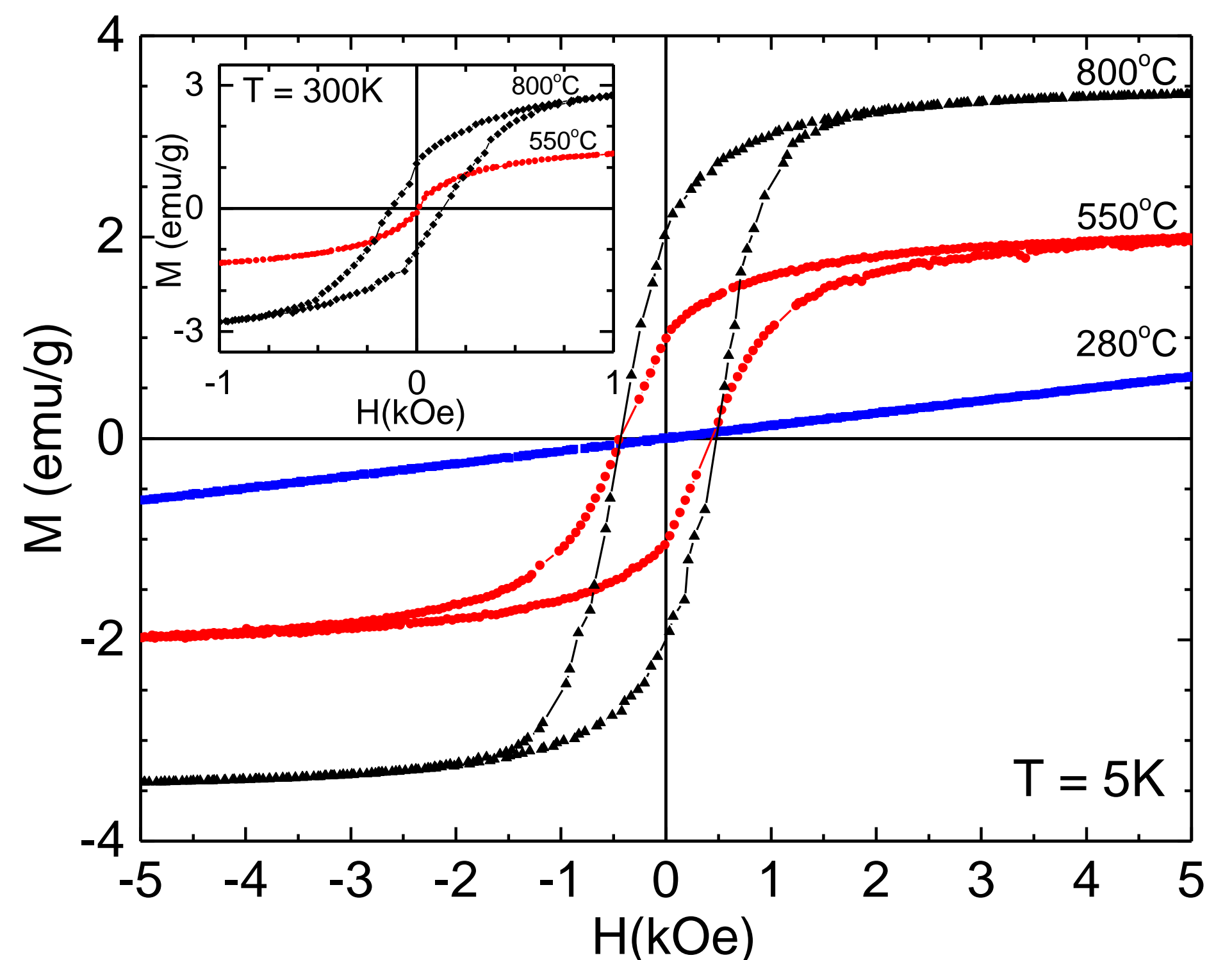
Carbonization Protocols

Program (1)—280 °C	Program (2)—550 °C	Program (3)—800 °C
$t_{\text{room}}-140\text{ °C}-10\text{ °C/min}$ Isotherm: 30 min $140-150\text{ °C}-2\text{ °C/min}$ Isotherm: 30 min $150-195\text{ °C}-1\text{ °C/min}$ Isotherm: 30 min $195-230\text{ °C}-1\text{ °C/min}$ Isotherm: 30 min $230-250\text{ °C}-1\text{ °C/min}$ Isotherm: 30 min $250-280\text{ °C}-1\text{ °C/min}$ Isotherm: 30 min	Program (1) + $280-300\text{ °C}-1\text{ °C/min}$ Isotherm: 30 min $300-350\text{ °C}-1\text{ °C/min}$ Isotherm: 30 min $350-550\text{ °C}-5\text{ °C/min}$ Isotherm: 30 min	Program (2) + $550-800\text{ °C}-5\text{ °C/min}$ Isotherm: 30 min



Electron Magnetic Resonance Spectra of Ni-NaPG_{280 C}, Ni-NaPG_{550 C}, Ni-NaPG_{800 C}.

The EMR spectra independently confirm the magnetic measurements:



Dependence of the specific magnetization on the magnitude of the magnetic field at temperatures of 5K and 300K (inset). Samples Ni-NaPG_{280 C}, Ni-NaPG_{550 C}, Ni-NaPG_{800 C}. Signatures correspond to the synthesis temperature. Up – field range $B < 5$ kOe, at the bottom - field range 0-90 kOe