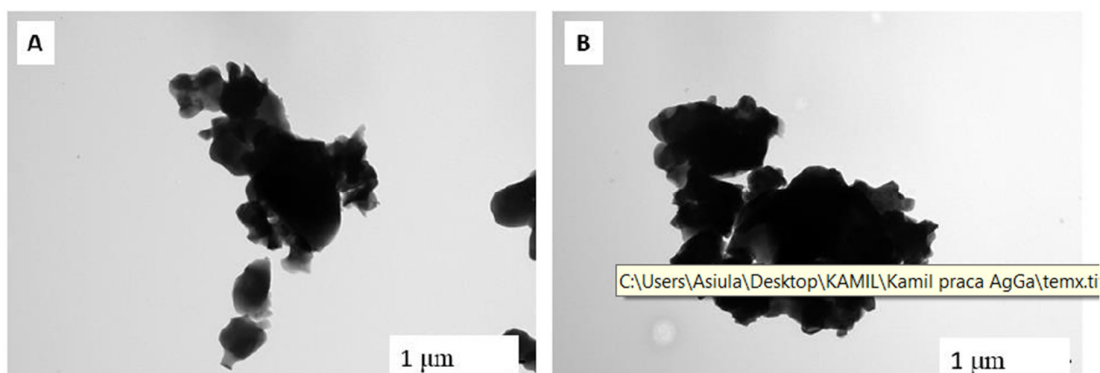
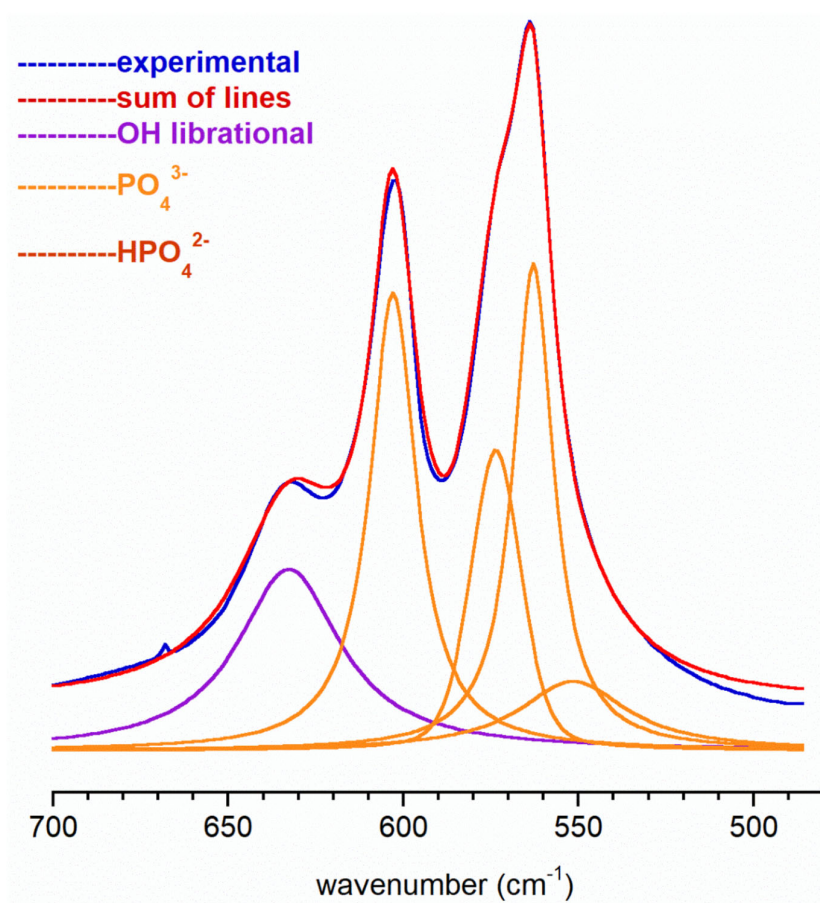




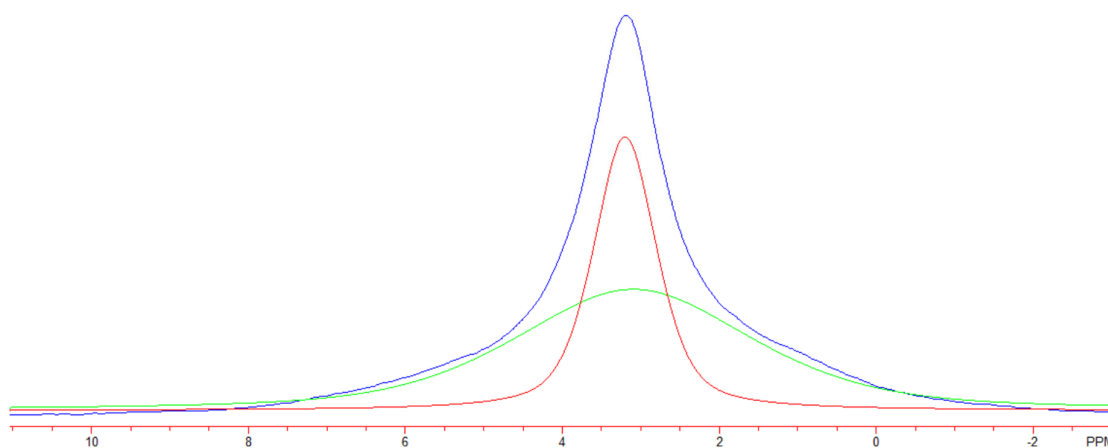
### Supplementary Materials



**Figure S1.** TEM micrographs of the 5Ag-HAd (A) and 5Ag5Ga-HAd (B) samples.



**Figure S2.** Curve fitting for the FT-IR spectrum of the 5Ag5Ga-HAd sample.



**Figure S3.** Line fitting for the  $^{31}\text{P}$  CP MAS NMR spectrum of the 5Ag-HAw sample (blue – an experimental line; red – a narrow line; green – w broad line).

**Table S1.** Share of librational bands in the region 700–480 cm<sup>-1</sup>.

% of total area OH librational bands	
HAw	30 ± 3
1Ag-HA	26 ± 2
5Ag-HAw	27 ± 2
5Ga-HAw	23 ± 2
1Ag5Ga-Haw	25 ± 1
5Ag5Ga-HAw	20 ± 2
HAd	34 ± 2
1Ag-HAd	30 ± 3
5Ag-HAd	28 ± 2
5Ga-HAd	21 ± 2
1Ag5Ga-Had	24 ± 2
5Ag5Ga-HAd	20 ± 3

**Table S2.** Curve fitting results for the 31P CP NMR spectra (MAS at 7.0 kHz, the CP contact time of 2 ms).

	Chemical shift (ppm)		FWHM <sub>a</sub> (Hz)		% of total area		
	narrow	broad	narrow	broad	narrow	broad	
HAw	3.09		3.01	144	418	51	49
1Ag-HAw	3.21		3.31	151	569	38	62
5Ag-HAw	3.20		3.10	153	579	38	62
5Ga-HAw	3.16		2.95	165	605	31	69
1Ag5Ga-Haw	3.17		3.25	154	570	36	64
5Ag5Ga-HAw	3.24		3.30	167	618	28	72
HAd	2.92		-	71	-	100	-
1Ag-HAd	2.87		-	70	-	100	-
5Ag-HAd	2.90		-	72	-	100	-
5Ga-HAd	2.88		-	74	-	100	-
1Ag5Ga-Had	2.88		-	75	-	100	-
5Ag5Ga-HAd	2.90		-	78	-	100	-

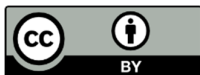
<sup>a</sup> full width in half minimum (in Hz).

**Table S3.** Neutral red uptake assay results for all dilutions of extracts obtained from tested samples after incubation in the culture medium.

Extract concentrations [mg/mL]:	100	50	25	12.5
<b>Sample:</b>	<b>Cells viability [%]:</b>			
HA-w	89 ± 8	100 ± 4	102 ± 5	103 ± 5
1Ag-HAw	84 ± 4	100 ± 8	97 ± 3	99 ± 5
5Ag-HAw	0 ± 0	92 ± 1	94 ± 2	94 ± 7
5Ga-HAw	82 ± 7	97 ± 9	98 ± 5	102 ± 6
1Ag5Ga-HAW	83 ± 5	89 ± 1	94 ± 3	104 ± 17
5Ag5G-HAW	96 ± 3	108 ± 5	105 ± 0	107 ± 4
HAd	97 ± 10	99 ± 4	101 ± 4	103 ± 3
1Ag-HAd	82 ± 6	93 ± 3	103 ± 3	100 ± 2
5Ag-HAd	81 ± 6	96 ± 2	109 ± 7	105 ± 3
5Ga-HAd	1 ± 1	3 ± 2	1 ± 1	25 ± 8
1Ag5Ga-HAd	4 ± 10	0 ± 1	32 ± 14	75 ± 9
5Ag5Ga-HAd	0 ± 0	4 ± 7	34 ± 8	82 ± 10

**Table S4.** Inhibition zone measurements (antimicrobial activity against *P. fluorescens*).

Sample	Inhibition zone (mm)
Haw	13
1Ag-Haw	16
5Ag-Haw	17
5Ga-Haw	17
1Ag5Ga-Haw	17
5Ag5Ga-Haw	19
HAd	13
1Ag-HAd	16
5Ag-HAd	17
5Ga-HAd	27
1Ag5Ga-HAd	28
5Ag5Ga-HAd	30



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